ASHESI UNIVERSITY COLLEGE

UNDERSTANDING THE IMPLICATION OF CHANGING LEVELS OF INFLATION ON STANDARD OF LIVING IN GHANA

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By

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DECLARATION

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ……

Candidate's Name: ……

Date: ……

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on the supervision of dissertation laid down by Ashesi University College.

Supervisor's Signature: ……

Supervisor's Name: ……

Date: ……..

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By emptying myself completely unto Him, I have found wisdom, strength, guidance and peace throughout the preparation of this dissertation and my four-year degree programme. My utmost gratitude goes to Almighty God.

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ABSTRACT

This paper explains how standard of living in Ghana is affected as inflation changes from time to time. The need for such understanding has become relevant considering the dramatic fluctuations of inflation in Ghana especially in 2012. Additionally, inflation happens to be one of the most keenly discussed indicators in Ghana even though it is not clear whether its meaning is not lost on those who love to talk about it. Furthermore, available literature does not only lack context-specific studies for Ghana; the literature also fails to agree on a common conclusion on the subject

Real GDP per capita and Human Development Index are used as indicators of standard of living. Employing a quantitative framework, the research uses regression and sensitivity analyses to explain the theoretical relationship between inflation and standard of living in Ghana, as well as determine the sensitivity of standard of living to inflation.

Using data for the period of 1980-2012 mostly obtained from the World Databank, the analyses performed establish that there is a significant negative statistical relationship between inflation and standard of living in Ghana. However, Inflation accounts for only a portion of changes in standard of living. This paper also proves that standard of living increases in sensitivity to inflation as inflation rate rises.

The study asserts that it is important to maintain a low stable rate of inflation in Ghana. The study also recommends indexation of salaries to prevent social problems such as strike actions. Furthermore, it highlights the need to make more public other indicators such as unemployment and poverty to give a better indication of the welfare of Ghanaians. With regards to further research, the study advises the use of other determinants of welfare to identify other factors that affect standard of living, and the use of primary data to determine the applicability of the theory established to reality.

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1 INTRODUCTION

1.1 Background

Inflation has emerged as a rather controversial indicator of economic health and standard of living in Ghana; with most newspaper pundits and policy analysts referring to it in discussing the economic health of the country.

According to Romer (2006), maintaining low inflation and high growth is a central objective of policy making, and in Ghana, the ruling Democratic National Congress (NDC) government has taken that advice to heart in a literal sense. It is therefore not surprising that in a political year as this one (2012), the behaviour of inflation over the years has been one of the main points of extensive discussion with the incumbent NDC government boasting of a stable inflation over a two-year period as a result of prudent governance[1].

The problem though, for the ruling NDC has been how to make these low numbers meaningful in the lives of Ghanaians in the face of arguments by the opposition (New Patriotic Party or the NPP), that the potency of low inflation as a panacea for development problems is weak at best and that at least in the short run low inflation actually leads to no jobs for ordinary Ghanaians because low inflation discourages production and stalls job creation.

Another factor that complicates the inflation issue for Ghana is the seeming lack of association between Ghana's exchange rates and inflation rates in exactly the more recent periods where inflation has been low. From about November 2011 to August 2012, the cedi lost significant ground against the dollar while Ghana's inflation (expected to increase in lock step) remained steady at a single digit average value just shy of 9%

[1] Although inflation is meant to be controlled by the Central Bank as an independent body, the situation is different in Ghana. In Ghana, monetary and fiscal policies are not completely independent of each other; the executive has some influence over monetary policy.
.

(Ghana Statistical Service, 2012). Since macroeconomic theory suggests an inverse association between inflation and the strength of the domestic currency (Mankiw, 2006), but this theory seems to fail for Ghana, it is little surprise the low inflation being touted by the ruling government is scorned by its detractors.

As a matter of fact, Ghana's inflation rate is currently known to have remained at a single digit since June 2010 (Kwakye, 2012). The opposition, on the other hand, has discredited the claim made by the incumbent government with the view that the downward trend does not reflect in the lives or the quality of life of Ghanaians (Gyasiwaa, 2012).

However, according to the Centre for Policy Analysis in Ghana, the downward trend in inflation has been due to a replacement of the 2009 budget with a three-year International Monetary Fund (IMF) programme, a Poverty Reduction and Growth Facility, which halted the depreciating exchange rate and caused a reversal in inflation from high and rising to a low and stable trend (Centre for Policy Analysis, 2011).

Economic growth is typically hindered by high and rising levels of inflation. In developing countries, an inflation rate of over 10% is said to hurt growth (Espinoza, Leon & Prasad, 2011). Thus, above the threshold of 10%, Espinoza, Leon & Prasad (2011) explain that inflation becomes costly for growth and would automatically call for radical policy changes. As per this analysis, low levels of inflation are desired for developing countries desiring to enjoy growth in GDP per capita.

All other things being equal, following the fact that inflation rate in Ghana has been maintained at a single digit over this two-year period, it is expected that the economy, and for that matter Ghanaians, should also do well as a result. However, the changing levels of inflation in the country cannot be immediately claimed to be the result

of a strengthened economy. There may be other factors that also influence the changing rate of inflation recorded by the Ghana Statistical Service (GSS). For instance, possible measurement error either through questionable methodology or through inaccurate data collection can obscure the actual inflation rate.

Over the years, revisions of the Consumer Price Index (CPI) basket have led to changes in the rates recorded. The CPI basket, which is explained in detail later, comprises selected goods of which prices are observed, recorded and weighed to determine inflation levels in the country. The goods are selected based on consumption level and are assigned weights according the quantities consumed. Goods with high consumption have greater weights and vice versa (Mankiw, 2003). The Ghana Statistical Service is currently working on revising the CPI basket from 242 items to 272 items (myjoyonline, 2012). This action, for instance, will influence the inflation rates recorded, and will not necessarily be an indication of whether the economy, and for that matter the people, are doing well or not.

Furthermore, the preference for low inflation rates as discussed by Espinoza, Leon & Prasad (2011) may not always be the case as Keynesian economics shows a preference for increased levels of spending (which will lead to high rates of inflation) during periods of depression to in order spur growth, an example being the Great Depression. In order to boost the economy and spur growth during the period of the Great Depression, increased level of spending was advised by Keynesian economists irrespective of that fact that increasing quantity demanded at a given supply level will lead to rising prices and hence inflation. A similar conclusion can be drawn from the simple Philips Curve which shows a negative relationship between unemployment and inflation in the short run. Thus, high inflation reduces unemployment and vice versa.

Broken down further in the perspective of these two theories, high inflation is a sign of increased spending and demand leading to the need to employ more people to produce.

The actual implication of changing inflation rates in Ghana on standard of living is therefore difficult to tell. With a lot of news on inflation, as well as the concern about inflation pressures especially this year as a result of the weak cedi, and the forecast (albeit inaccurate) that inflation is likely to hit a double digit at the end of 2012, there is a lot to be said about how people actually get affected, or what the implications are in the near future (BFTOnline, 2012).

Inflation is undoubtedly an important indicator of the performance of the economy, but an understanding of how it affects life is also important. The aim of this study is therefore to identify how standard of living of Ghanaians, which is measured by real GDP per capita and HDI in this study, is affected by changes in inflation using data from past periods.

Figure 1.1: **Summary of Indicators for Ghana (2009 – 2011)**

	unit	2009	2010*	2011**
Gross Domestic Product (GDP) at current market prices	*million Gh¢*	36,598	46,042	59,264
	million US$	25,798	32,186	39,151
GDP per capita	*Gh¢*	1,563	1,901	2,419
	US$	1,102	1,329	1,598
Gross Domestic Product (GDP) at constant (2006) prices	*million Gh¢*	22,454	24,252	27,742
GDP growth rate	*%*	4.0	8.0	14.4
Gross National Income (GNI) at current market prices	*million US$*	25,500	31,786	58,615
GNI per capita	*USD*	1,089	1,312	2,392
Inflation (annual average)	*%*	19.3	10.8	8.7
Balance of Trade	*million US$*	-2,207	-2,962	-3,183
Government expenditure (& net lending)	*million Gh¢*	8,346	11,532	5,642
Population[1]	*'000 000*	23.4	24.2	24.5

Source: Ghana Statistical Service (2012).

The figure above presents data from the Ghana Statistical Service on a summary of important economic indicators over a three (3)-year period. It is worth noting that the table presents information on some economic indicators which are not as popular in the media as inflation. In the context of the central issue of this paper, inflation (annual average rates) over the period has decreased by a decreasing rate of 44% from 2009 to 2010, and 19% from 2010 to 2011. GDP growth has behaved in the opposite direction as inflation, increasing throughout the period. As the economy currently stands, GDP growth is very likely to increase significantly in the future due to commercial exploration of oil in Ghana which started in 2011. It is therefore important not to be deceived by the high growth figures that may be recorded owing to the fact that they may not directly mean an improvement in standard of living but rather, the impact of the oil exploration. In addition to that, the high growth figures likely to be recorded would not necessarily reflect fundamental weaknesses in the economy in the form of serious fluctuations in power supply, non-existent infrastructure, high cost of importation, high interest rates, corruption and weak institutions. GDP per capita, which is a better measure of welfare among the indicators present, since it demonstrates distribution of income among individuals in the country, and measured in Ghana cedis as seen from the table, has also increased throughout the period. However, the increase is almost stable around 20%. Thus, the behaviour in GDP per capita cannot be immediately inferred from trends in inflation.

1.1.1 Understanding inflation and inflation trends in developing countries

Inflation is precisely the general increase in price levels. Inflation rate, which is the usual reported statistic, is the percentage change of price levels (Mankiw, 2003). High inflation rates, although undesirable, have been known to be a distinguishing macroeconomic feature of developing economies especially Latin America (Calvo & Végh, 1997).

High inflation rates increase the cost of living which has the potential to reduce standard of living if incomes are not increased proportionally (or indexed for inflation). High inflation is also undesirable because not only does it lead to a permanent reduction in per capita income; it also reduces investment and the level of production efficiency (Feldstein, 1999).

An important factor that should come to mind when studying these theories on inflation is that the various classic theories on inflation were formed long ago with focus on now developed countries which were developing in those times and may not apply to developing countries today.

According to Calvo & Végh (1997), developing countries have accommodated high and persistent inflation over the years by creating various indexing options which actually make room for high inflation levels. These high inflation levels occur concurrently with increase in money supply. Thus, inflation is a monetary phenomenon (Friedman, 1971).

Interestingly, the trend of very high levels of inflation has not been the only phenomenon in the history of Africa. According to Aryeetey et al (2012), Africa had a benign inflation environment from 1990 to 2000 with inflation rates not higher than 25% which began a period of economic growth for oil importers and exporters in Africa.

During this period, GDP growth rate was higher than population growth leading to increase in the average income per person and avoiding the infamous “Malthusian era”. However, despite this seeming achievement, a ceiling of 25% is still relatively high. This phase did not last long in Africa though, as the food and fuel crisis spurred inflation beyond targets set by various central banks in Africa (Aryeetey et al, 2012).

During this period of supposed growth experienced by the African economy as a whole characterised by supposedly low rates of inflation, Killick (2010) reports increasing levels of GDP per capita from 1992-2002 period. This analysis gives an indication of an inverse relationship between inflation and growth at least in the long run.

Romer (2006), like Friedman before him, attributes long run inflation to increases in money supply since growth in aggregate demand in the long run is due to increase in money supply. In the case of Ghana, monetary expansion had become too high to be absorbed starting from the 1963 leading to very high levels of inflation (Killick, 2010).

However, looking at the current reported inflation rates and comparing these rates to early years especially in the 1970s, inflation rates now are not as high despite robust growth even though they remain relatively very high compared to advanced countries. Of course the jury is still out as to whether the recent reported low rates of inflation by the Ghana Statistical Service (GSS) are methodologically accurate, but we are not in the position to pass judgment.

1.1.2 Why Inflation is a big deal in developing countries

Developing countries are poorer than developed countries and have less developed economies and financial systems. In particular, the executive has substantial control over the central bank and monetary policy in developing countries. When the government needs money, it often requires the Central Bank to print more money. This acts like a tax on its citizens (called seigniorage) but more importantly, it leads to a depreciating currency.

Zimbabwe and, to a lesser extent, Ghana are classic examples of this occurrence. In Zimbabwe, after a history of unbudgeted spending in the face of declining tax revenue, the government printed more money with the aim of catering for spending

needs as well as payment of its debt. Such increases in the supply of money over a period contributed to the massive hyperinflation crisis experienced by the country in 2008-2011 (Federal Reserve Bank of Dallas, 2011).

In the case of Ghana, 1973-1982 was similarly characterized by monetary expansionary policy in order to fund the huge balance of payment deficits the country faced at the time. It is recorded that inflation reached as high as 123% by 1983 (Ghana Statistical Service annual report; 1984 issue in Appiah & Boahene)

The control that the executive has over monetary policy and the subsequent inflation that results from its demand for liquidity is obvious. If a developing country can keep inflation low, then it means that financial discipline is high, and consequently, the benefits of such low inflation can be seen in the economy and citizens can ultimately benefit. Ghana has experienced an average downward trend in inflation according to data from past periods. However, the benefits of such downward trend in relation to standard of living have not been explicit.

Inflation also moves concurrently with exchange rate to determine whether an economy will be stable or not (EconomyWatch, 2010). Inflation reduces the value of the currency and undermines the exchange rate. Thus, the exchange rate between two different currencies of two countries is a result of the prevailing inflation levels between the two countries (CommerceGhana, 2012). This sums up the Purchasing Power Parity theory which concludes that “Under a floating rate exchange rate system, exchange rates adjust to offset differential rates of inflation between countries that are trade partners in such a way as to restore balance of payments equilibrium (Pass, Lowes & Davies, 2005: page 437).” As the exchange rate increases, purchasing power reduces. In the long run, inflation in Ghana is positively related to exchange rate with evidence of

a transmission effect within a one-month lag (Bawumia & Abradu-Otoo, 2003).This shows how quickly inflation affects exchange rate and influences the purchasing power of Ghanaians which affects standard of living through changes in the cost of living.

The consequence of a weak currency like the cedi in the case of Ghana, a country which is heavily dependent on imports (since the Ghanaian manufacturing sector is non-existent), can be catastrophic: Ghanaian residents will find imports from abroad super expensive with no alternative from domestic production. This undermines standard of living especially for the rural poor.

1.1.3 Behaviour of variables under study over the years

The behaviour of the variables under study: inflation, real GDP per capita and HDI (defined in the next section) with respect to Ghana, Kenya and South Africa over the years (1980-2010) is shown in Charts 1.1, 1.2 and 1.4. Historical behaviour of inflation, real GDP per capita and HDI for the three countries over the years are illustrated in Chart 1.1, Chart 1.2 and Chart 1.4 respectively. In addition, trend in GDP per capita growth for all three countries over the same period is illustrated in Chart 1.3 to give a clearer picture of exactly how GDP per capita has moved within the years under review. As explained earlier, a lower inflation rate is usually preferred and is expected to be a good indication of standard of living. In this case therefore, it is expected that during the periods where there are low inflation, real GDP per capita and HDI be high and vice versa. However, the behaviour of these variables cannot be easily inferred as will be seen below according to data for the indicated period as taken from the World DataBank (2012).

South Africa and Kenya are used in addition to Ghana in plotting the graphs to show comparison because South Africa is one of the most developed countries in Africa with a low and less fluctuating inflation and a relatively high real GDP per capita.

However, similar to Ghana, Kenya has a low real GDP per capita like South Africa. HDI rates are similar for both Ghana and Kenya. With different inflation rates for Ghana and Kenya, one would expect to see real GDP per capita over the years for both countries responding to the unique pattern of inflation for the respective country. Furthermore, ideally, different inflation patterns should also yield their unique HDI patterns showing higher HDI for periods with lower inflation rates and vice versa if indeed low inflation rates are desired for better standard of living (standard of living in this case being measured by real GDP per capita and HDI). It is however noteworthy that this is a general analysis and therefore robust conclusions cannot be made at this stage.

South Africa records a rather very high real GDP per capita and high HDI relatively. This puts the analysis in the context in determining the role of inflation with regards to welfare. The charts below show how these variables have behaved over the years for the countries mentioned:

***Chart 1.1*: Movement of Inflation (1980 – 2010)**

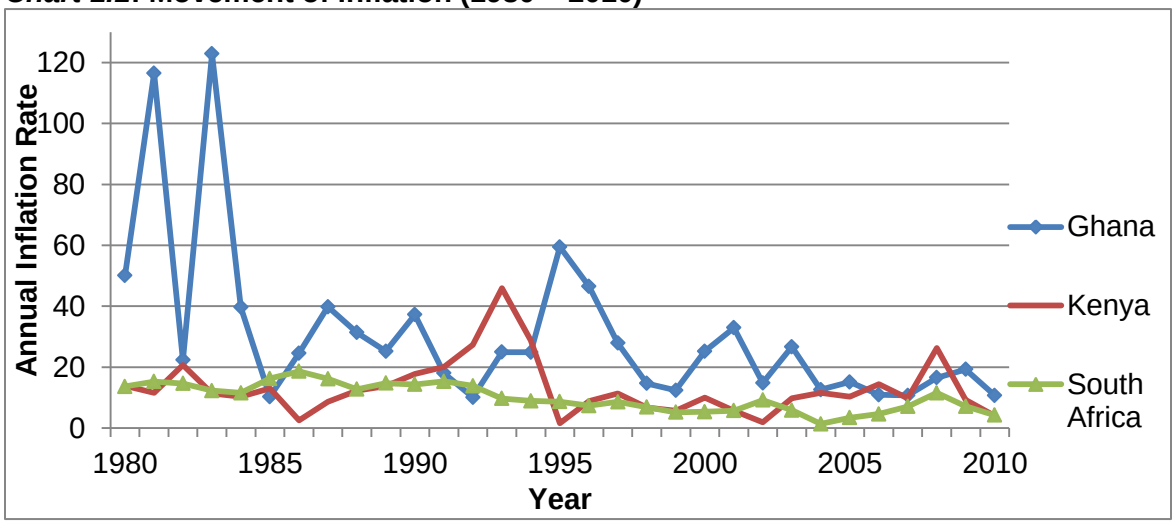


Chart 1.2: **Trend in real GDP per capita (1980 - 2010)**

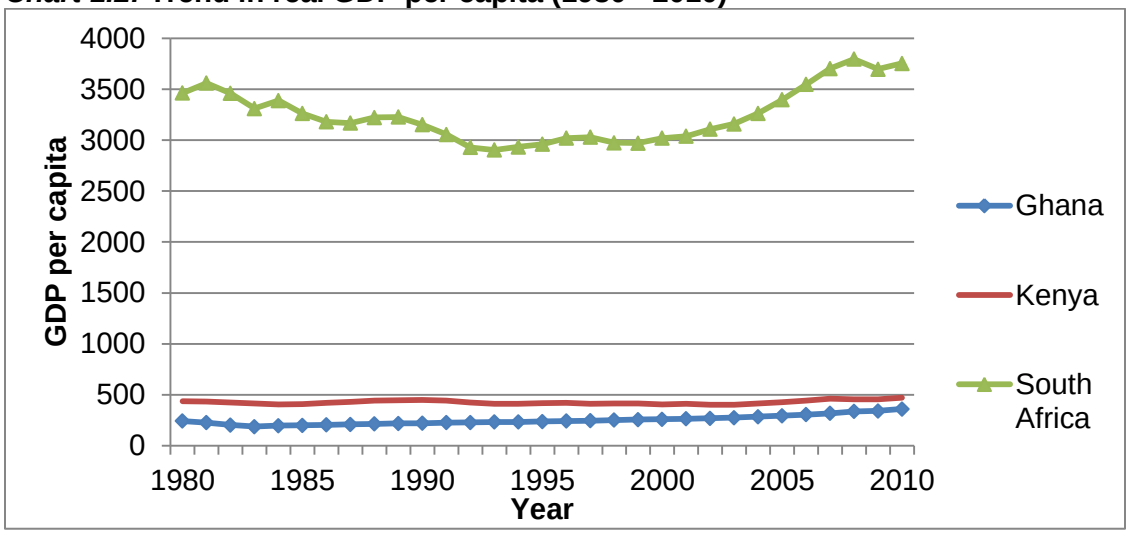


Chart 1.3: **Trend in GDP per capita growth (1980-2010)**

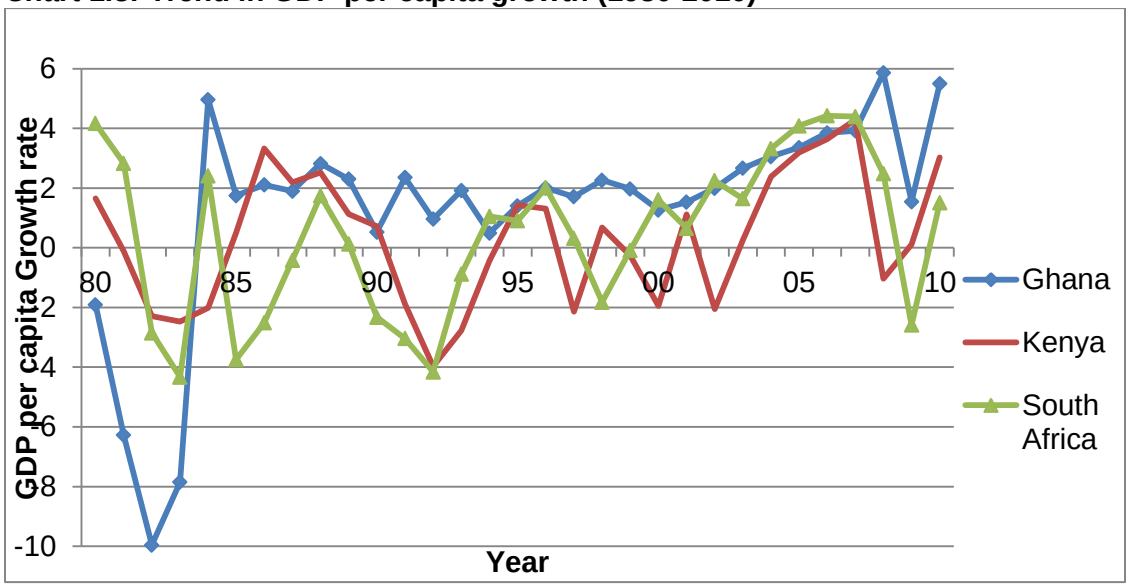
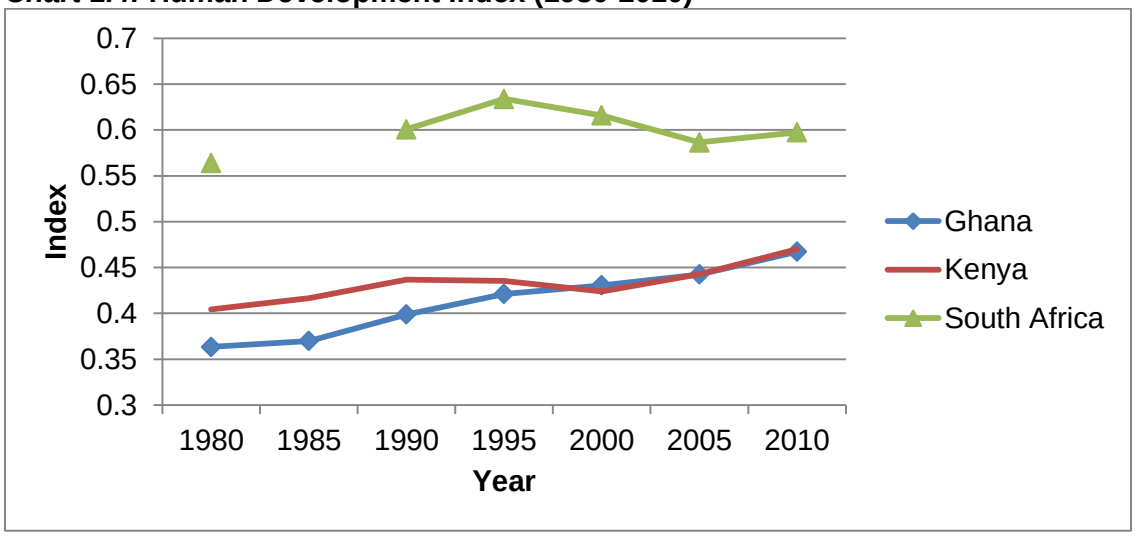


Chart 1.4: **Human Development Index (1980-2010)**



Data for charts taken from World Databank – Indicators & International Human Development Indicators

With reference to Charts 1.1, 1.2, 1.3 and 1.4 above, all three countries have unique situations with regards to how the variables have behaved over the years. In Ghana, it is evident that the economy has transitioned from a period of high inflation with some years recording inflation rates of 50% and more to a state where inflation is well below 20% since 2004. However, considering the same period, standard of living has improved, but not in the exact same proportion as the decrease in inflation, judging from the fact that the real GDP per capita and HDI curves represented by Charts 1.2 and 1.4 respectively do not slope significantly. GDP capita growth, on the other hand, shows Ghana to be the best performing country as plots lie above other countries most of the time having started from a negative growth. GDP per capita growth for Ghana plummeted in 2009, possibly as a result of the global economic meltdown, the period following 2009 shows a bounce back as there is evidence of an increase in growth as seen from the chart.

South Africa's low inflation levels appear to correspond with its high real GDP per capita and HDI. Thus, with very relatively minimal fluctuations in inflation, real GDP per capita and HDI for South Africa have also maintained a somewhat gradual increase. A more critical observation for recent years shows that inflation actually increased within the 2004-2008 period while HDI shows evidence of a downward trend around the same period. Therefore, from the case of South Africa, it can be inferred that inflation and welfare are negatively correlated. Standing on its own, GDP per capita growth for South Africa illustrated in Chart 1.4 shows significant fluctuations which cannot be immediately traced to inflation.

Kenya's situation is unique considering the obvious movement in inflation between 1990 and 2000 of which almost no effect is seen on real GDP per capita. However, GDP per capita growth shows evidence of a negative correlation between GDP per capita and inflation: for instance, an upward surge in inflation from 1990 to 1993 followed by a subsequent downward trend in inflation is the direct opposite of what is observed for GDP per capita growth. Thus the movement in real GDP per capita is made clearer with the help of the GDP per capita growth chart. HDI gives evidence of a gradual upward trend which cannot be immediately traced to inflation. Thus, much is left to be studied with regards to how inflation affects standard of living.

1.2 Operational definition of variables

There are three key variables with respect to this study. These are the inflation (measured as a change in the Consumer Price Index or price level), real Gross Domestic Product (GDP) per capita and the Human Development Index (HDI). Real GDP per capita and HDI are used as indicators of standard of living (standard of living is used interchangeably with welfare to mean the same thing in this study) while inflation is used as a determinant of welfare.

1.2.1 Consumer Price Index (CPI) as a measure of inflation

By definition, the Consumer Price Index is a weighted average of the prices of a basket of goods and services representative of most frequent consumer purchases in an economy (Pass, Lowes & Davies, 2005). The weights of the items are given as per their importance or size to total consumer expenditure. In Ghana, the CPI basket currently constitutes 242 goods which are broken down into twelve (12) categories of "consumption by purpose" goods. The goods are intended to be reflective of a typical Ghanaian household spending. The price levels of these categories are compiled as well as weights that are assigned to them to determine inflation (Ohemeng, 2012).

1.2.2 Real GDP per capita

Real GDP per capita simply represents annual Gross Domestic Product which has been adjusted for inflation divided by the total population of a given economy in order to determine the output or income per head. Real GDP per capita is however, is not an accurate measure of welfare as a result of shortfalls of its key component, the GDP, as well as distribution problems. GDP measures the monetary value of goods and services produced in a country over time (Callen, 2012). It consists of only goods and services that are produced for sale and as such, other products and services that are not made for sale are not reflected in the GDP even though those goods may be consumed; depreciation is also not accounted for in the measurement of GDP (Callen, 2012). In addition to that, total national income is not fairly distributed among the populace in reality; these problems of GDP render real GDP per capita an inaccurate measure of welfare. However, most studies use real GDP per capita as a measure of welfare. Real GDP per capita was therefore used to enable comparability of the findings of this study to other research. GDP per capita constant 2000 USD are used for real GDP per capita values in this study.

1.2.3 Human Development Index

The Human Development Index is a weighted average of identified indices of welfare. There are three components: GDP, literacy and life expectancy; and each of these three components carry equal weights. Literacy is further broken down into two components: school enrolment and adult literacy of which school enrolment constitutes a third of a total weight of three and adult literacy carries two (Todaro & Smith, 2006). By its contribution, the HDI is recognized as a better indication of socio-economic welfare than the GDP and the GDP per capita. This is because under the HDI, standard of living or underdevelopment comprises predetermined basic capabilities other than income. In addition, the HDI is focused on escape of poverty and pays more attention to people's welfare (Crafts, 1997). Therefore, together with the real GDP per capita, the HDI was used as another indicator of standard of living.

1.3 Problem Statement

In Ghana, the rate of inflation can be said to be the most publicly discussed economic indicator when it comes to the economic welfare of the economy and Ghanaians in general. Furthermore, the year 2012 has experienced a lot of movements in inflation which was mostly attributed to the depreciation of the cedi. Having transitioned from a period of relatively high inflation to another of relatively low inflation over the years in Ghana, does it mean that the welfare of Ghanaians has also improved significantly? Revisions of the CPI basket also alter inflation rates, and since the Ghana Statistical Services has announced revisions to the CPI basket, the actual causes and implication of changing rates of inflation became even murkier. In economic theory developed years ago mostly for developed countries, low rates of inflation are desirable for the overall welfare of the economy at least in the long run (even though Keynes argues convincingly that the opposite is true in the short run). As inflation data continuously floods the media and political discourses continue without any in-depth

explanation about what the numbers mean, it is difficult to make sense of the figures in terms of how people are affected, and whether Ghana's situation follows economic theory or has its own context-specific underpinnings. In addition, reports on inflation do not add much to literacy or civic education if the average person does not understand what changes in inflation rates mean. This study therefore seeks to probe into the implication of changing rates on inflation on standard of living of Ghanaians in order to present findings to aid in a meaningful understanding of the effect of changing inflation rates on welfare of people as far as Ghana is concerned.

1.4 1.4 Research Question

What is the implication of changing levels of inflation on standard of living of Ghanaians?

1.5 Research Objectives

In order to successfully determine how standard of living responds to changes in inflation in Ghana, the objectives in the course of this study are:

To establish and explain the theoretical effects of changing levels of inflation on standard of living in Ghana. As part of the search to determine how inflation affects standard of living in Ghana, this is one basic goal of the entire study. It is only when a relationship has been established between inflation and standard of living that further probing can be done to bring to light the implications of inflation on standard of living in Ghana.

To determine sensitivity of standard of living of Ghanaians to changing inflation levels. Having identified any relationship that may exist between inflation and standard of living, the sensitivity of real GDP per capita and HDI to inflation were determined in order to give a better understanding of the influence of inflation on standard of living.

To make recommendations concerning measurement and reporting of inflation and other independent indicators in Ghana, that will also be helpful to policymakers. This study also hopes to make a useful contribution to policy makers by making obvious the impact of inflation on standard of living in Ghana in order to make recommendation concerning the measurement, control and reporting of the statistic in Ghana.

1.6 Relevance of Study

There is quite a whole lot of noise about inflation in Ghana as trends in inflation are often reported. This is not to undermine the importance of inflation in an economy. However, a better understanding of how the indicator affects standard of living will enable a better appreciation of the statistic. Consequently, the general implication is that high levels of inflation are bad for the economy. However, it is not enough to claim that inflation affects welfare negatively. This is because all countries do not respond in the exact same manner to inflation. It is therefore important to understand the unique case of Ghana with respect to the implication of inflation on welfare. In light of this, this study is necessary as it will:

1. Provide the needed information aimed at assisting the average person understand how changes in inflation reflects in standard of living. With this knowledge, the average Ghanaian can deduce how quality of life is affected with respect trends in inflation and better understand the state of the economy and respond accordingly.
2. Assist policymakers by giving them relevant information on how standard of living is affected by inflation so that the necessary attention is given to maintaining the right levels of inflation.

3. Make a contribution to existing literature by giving a more detailed interpretation to changes in inflation with respect to actual changes in standard of living of Ghana as such context-specific literature is not immediately available.

1.7 Outline of Study

1.7.1 Introduction

This section introduces the research. It gives the background to the study and puts the study in context of general information and discusses the relevant variables. It also focuses the study by indicating the research question and the objectives that were achieved to answer the research question. The relevance of the study is also highlighted.

1.7.2 Literature Review

The literature review section mainly puts the proposed study in the context of other research and highlights the significance of the study be making clear the uniqueness and contribution of the study. The theoretical framework of the research is also presented in this section.

1.7.3 Methodology

The methodology section talks about how the research was carried out in terms of types and sources of data as well as the kind of analysis that were used so that the research question is answered as well as the objectives achieved.

1.7.4 Findings, Data Analysis and Discussion of Results

This aspect of the research makes an analysis of all the relevant data that are collected for the study and provides results based on the simulations used.

1.7.5 Conclusions, Recommendations and Further Research

Having introduced the study, set it in context, collected and analysed data, conclusions are drawn on the subject matter. Further research is also highlighted.

2 LITERATURE REVIEW

2.1 Introduction

This section of the study analyses and discusses the work of various authors on the subject matter: which is the implication of changing levels of inflation on the standard of living or the welfare of people; the context of the study being Ghana. In a lot of the studies discussed in this section, authors use GDP per capita or GDP per capita growth as a measure of standard of living.

Studies where growth of an economy itself as a whole, thus GDP, is used as an indicator of wellbeing are also discussed. This is because growth in income, which is equal to growth in output usually measured as economic growth, can be interpreted as improvement in welfare since increasing income is an indication of expansion of resources (Ranis, 2004).

The criticisms by Amartya Sen and Douglas North in particular about the inadequacy of GDP per capita as a measure of welfare have been taken into consideration. In addition, the view of the UN that the Human Development Index (HDI) better captures the concerns about the measurement of welfare pointed out by Sen and North is agreed with. However, works linking HDI and inflation are very rare accounting for the incorporation of studies that use other indicators of standard of living like GDP per capita, GDP per capita growth and GDP growth. The literature review places the current study in context of other studies and highlights the relevance of the study as well as the contribution it will make to literature.

2.2 A review of the inflation-growth literature

The work of Bruno and Easterly (1995) is one of the influential pieces on this matter. In addressing the problem of growth effects of high inflation crisis, the authors conclude that there is no evidence of a correlation between inflation and per capita growth in the

long run. Bruno and Easterly's (1995) main argument is that upon removing very high rates of inflation, long run averages of inflation and GDP per capita growth do not have any consistent relationship. Bruno and Easterly regressed inflation on GDP per capita growth and other measures of standard of living using a time series data for 127 countries including both developed and underdeveloped countries in a nonparametric approach. They observed that per capita growth falls very sharply during inflation crisis and increases very rapidly when inflation falls; growth turning negative only when inflation was higher than 40% (Bruno & Easterly, 1995). Hence, the fall in growth and its subsequent recovery cancel out to almost a zero. Having taken the stance that inflation and GDP per capita growth are only weakly correlated, the major problem of this piece is that the use of group data does not reveal individual trends that are unique to countries which brings about the problem of overgeneralization of results due to a shallow/surface analysis.

***Figure 2.1*: Inflation and Per Capita Growth, 1960-1992 (pooled annul observations, 127 countries)**

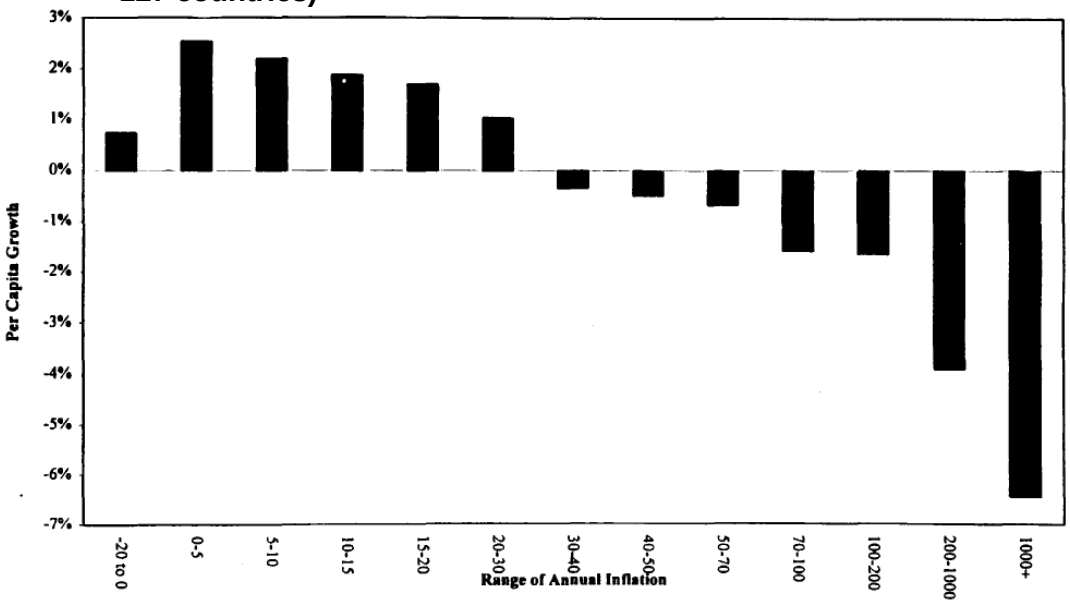
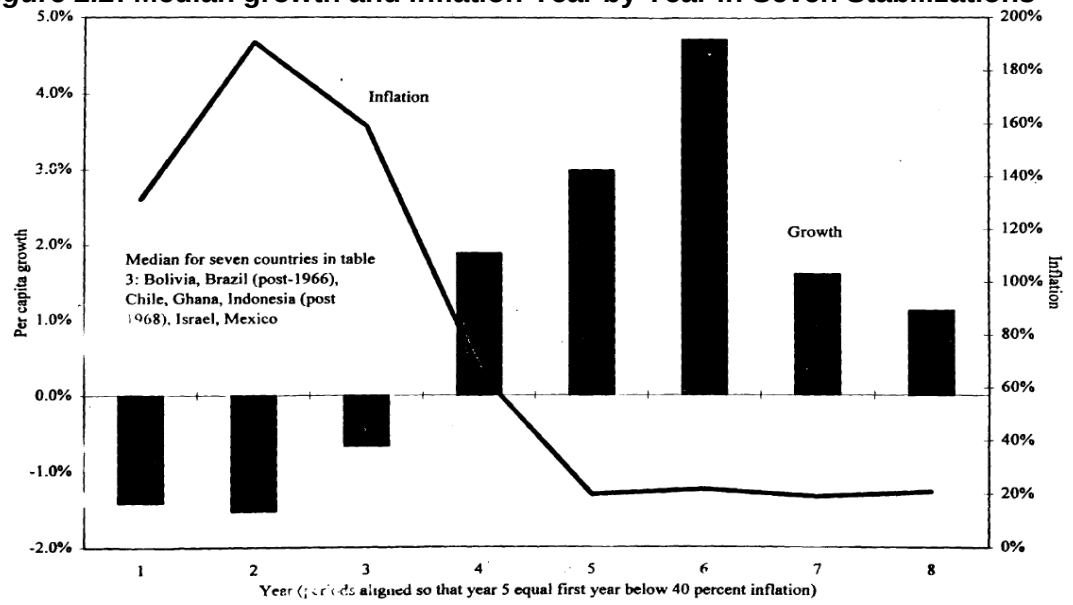


***Figure 2.2*: Median growth and Inflation Year by Year in Seven Stabilizations**



Source of Data: Bruno & Easterly (1995). Inflation Crisis and Long-Run Growth. Policy Research Working Paper 1517.

Figures 2.1 & 2.2 above represent some of the main findings in the work of Bruno and Easterly (1995) as discussed. Different sample sizes from different countries were used for the various ranges of inflation that have been used in each of the figures, and that has contributed significantly to the differences in the findings shown.

With reference to figure 2.1, out of a total of 2932 samples used (samples come from 127 countries over a 32-year period), different sample sizes were used for each range of inflation observation: 856 and 721 inflation observations were used for inflation rates of 0-5% and 5-10% respectively, the highest in the sample sizes of all the ranges in inflation. High inflation ranges (starting from 40%) barely had 50 sample sizes. It is therefore not surprising that high inflation rates did not have much influence on the overall data leading to the conclusion of the paper. However, when overall range of inflation was reduced and few countries were focused on which is the case in figure 2.2, the relationship between inflation and per capita growth cannot be entirely neglected.

The authors however maintained their conclusion that inflation and growth are not correlated in the long run. It is also interesting to note that in the second analysis (findings presented in figure 2.2) where fewer countries were used, most of the data came from developing countries. As observed, growth is much higher for low inflation periods and it takes very high inflation rates to make per capita growth negative. This is evidence of a correlation somehow.

Stanners (1996) is of the opinion that there is no evidence to support the existence, if any, of a correlation between low inflation and an improved growth rate. This is contrary to the work of Barro (1995), which was based on an earlier study done by Barro and Sala-i-Martin (1995), which concluded that a significant negative relationship exists between inflation and economic growth. By regressing data for the period of 1960-1990 for about a hundred countries, Barro (1995) detected a causal relationship between inflation and growth as well as inflation and investment observing that an average increase in inflation by 10 percentage points in a year led to a reduction in GDP per capita by 0.2-0.3 percentage points and a reduction in investment to GDP by 0.4-0.6 percentage points.

By critiquing the work of Barro (1995), Stanners (1996) reinforces his conclusions. A summary of Barro's analysis (1995) as seen from Stanners' (1996) critique paper is a plotted graph of residual real GDP per capita growth (which according to the paper is the remaining growth after the effects of other determinants of growth like education and fertility are removed) against inflation rate. The plots show that at inflation rates of 15% and below, real GDP per capita and inflation are not related. The two variables, however, show evidence of a relationship when inflation rates are as high as 20% approximately and beyond. These results of the analysis made by Barro (1995) can be seen in the diagrams below:

***Figure 2.3*: A plot of per capita growth rate (part unexplained by other variables) on inflation for inflation rates of 15% and below**

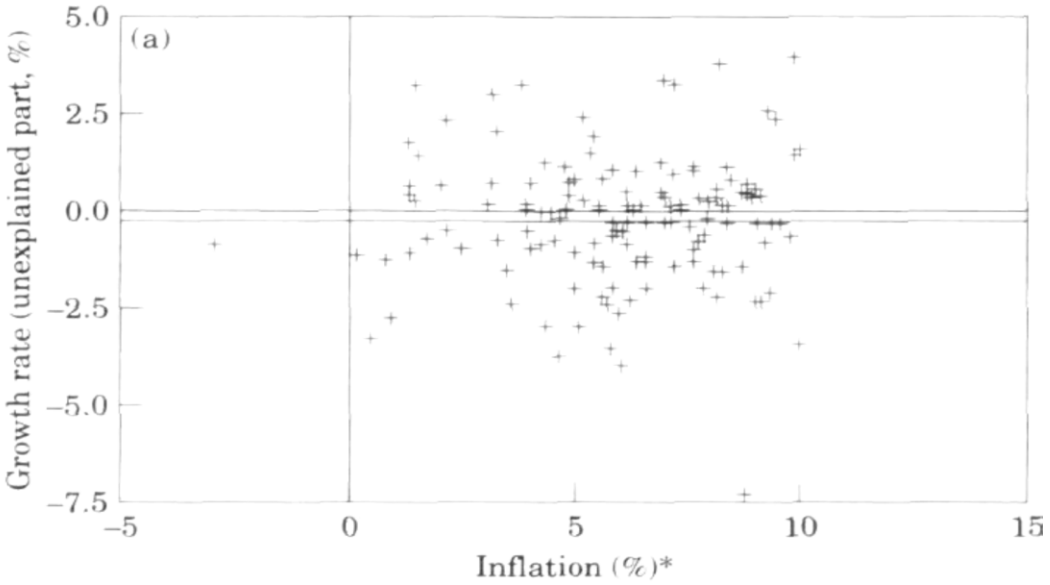
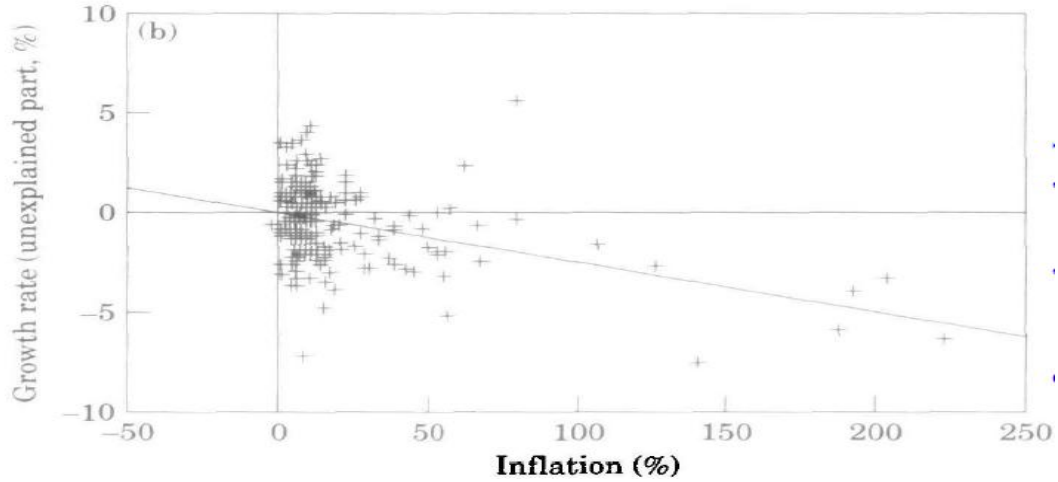


***Figure 2.4*: A plot of per capita growth rate (part unexplained by other variables) on inflation for inflation rates between 15% and 250%**



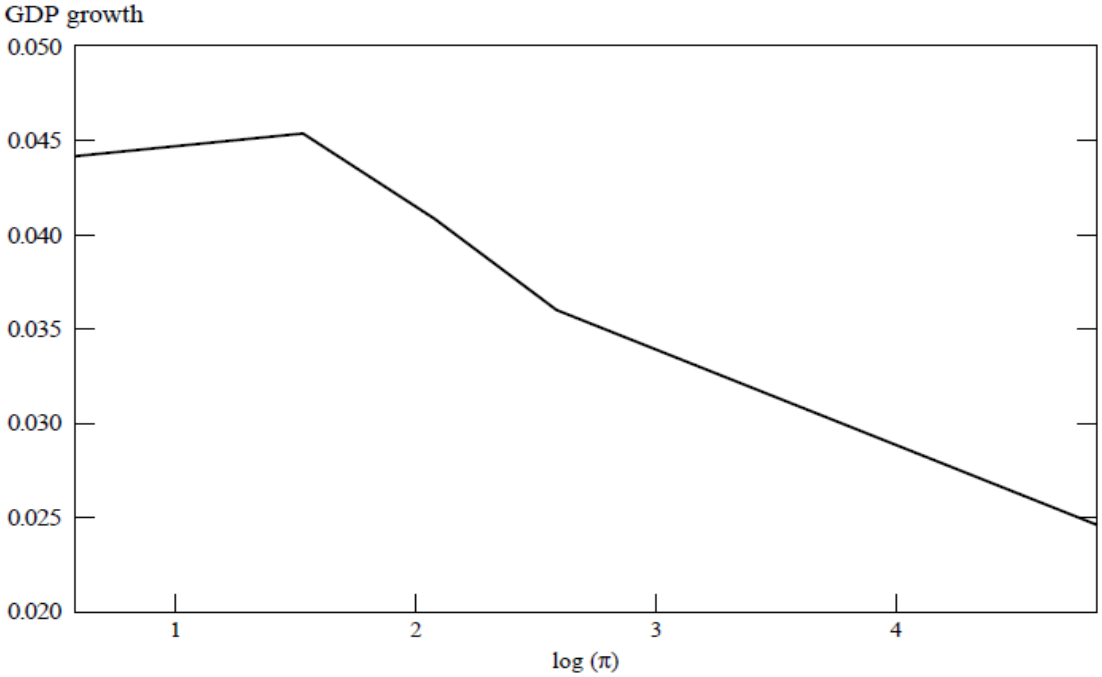
Source: Barro (1995) as seen in Stanners (1996). Inflation and Growth. Cambridge Journal of Economics. (20). 509-512.

According to Stanners (1996), Barro (1995) contradicts himself having observed from Figure 2.3 that there is no relationship between inflation and GDP per capita growth especially at inflation rates of 15% and below which reinforces Stanners' stance on the issue.

Stanners (1996) also further argues that countries that recorded low per capita real GDP growth with inflation rates between 200% and 250% are not a basis for concluding that inflation and welfare are actually inversely correlated because there are countries that recorded low rates of GDP per capita in times of low inflation. Stanners (1996) also raises concerns about the population Barro (1995) uses in his study and observed that Barro (1995) uses a sample that it is not exactly representative to draw conclusions. Overall, none of these conclusions can be taken as set in stone especially in the case of developing countries.

Khan and Senhadji (2001) explore the effect of inflation on economic growth with focus on the exact level of inflation that becomes problematic using panel data from 140 countries. A statistical approach was used in the analysis. Khan and Senhadji (2001) to some extent take a middle ground with the opinion that there can be non-existent relationship between inflation and growth at low levels of inflation; however, high inflation rates are definitely associated with negative growth in the medium and long term in line with their analysis. According to this study, high inflation is within the range of 1-3% and beyond for developed countries and 11-12% and beyond for developing countries. Khan and Senhadji (2001) also tested the robustness of the findings by Bruno and Easterly (1995) that a negative relationship exists between inflation and growth only for high-inflation observations and for high frequency data, and observe that there is a strong relationship even when average data over 5 years are used.

***Figure 2.5*: Relationship between real GDP growth and inflation.**



Source: Khan & Senhadji (2001). *Threshold effects in the Relationship between Inflation and Growth.*

Figure 2.5 above is a plot of real GDP growth against the logarithm of inflation made by of Khan and Senhadji (2001). By taking the logarithm of inflation, inflation data is smoothened to five levels. The middle ground stance taken is seen from the above figure as growth seems to increase only slightly at low levels of inflation and decline rather sharply at high levels of inflation. This observation would be strengthened if a regression analysis were used (Khan and Senhadji, 2001). The study concludes with the fact that inflation rates higher than thresholds have adverse effect on growth; and critiques the conclusion that there is no significant correlation between inflation and growth at inflation rates below 40% (Bruno & Easterly, 1995) since the data used to draw that conclusion of no correlation comprised only mean comparisons which weakens the findings.

Bashir (2002) takes a different perspective in analysing the relationship between inflation and growth. He focuses his analysis on an Islamic population and concludes with the opinion that inflation and economic growth are negatively related such that

inflation reduces welfare and hinders economic growth. This he does using a mathematical model: a basic neoclassical model in which financial factors play significant roles. Some of the observations in Bashir's model (2002) are also that inflation is negatively related to demand and consumption. By identifying how inflation alters demand and consumption, Bashir (2002) can be said to also pay attention to the effect of inflation on individuals which is similar to Shiller (1997) who starts with the premise that people generally dislike inflation.

By focusing on people, Shiller (1997) acknowledges the translation of inflation into high prices as well as the fact that inflation rates have an effect on the approval ratings for presidents and the turnout of elections. Little wonder this is the case in Ghana as observed especially in this 2012 election year.

To determine the welfare effects of inflation, Shiller (1997) employs more of a qualitative approach by obtaining data, through questionnaires, about the people's perceptions on effects of inflation on standard of living. The data collection approach employed potentially suffers from a sample selection bias because it limits data collection to people who have understanding on the subject matter based on the researcher's judgment (Shiller, 2007).

The conclusion from Shiller (1997) is that people have the opinion that inflation erodes their standard of living: a conclusion unlikely to be reached by classical economists. Despite the selection/response bias that is very likely to be embedded in this approach since the population may not be well represented, it is one of the few studies that actually obtain primary data from the people in determining the effect of inflation on the welfare of people. By using samples from the United States and Germany, the general dislike for inflation by the masses is evident in both countries.

Conversely, experts (economists) from the United States who also participated in the survey did not agree that inflation was a big problem.

Another discussion of studies done on this subject matter is the work of Saad-Filho and Mollo (2002). In analysing the Brazilian stabilization policy of 1994, also known as the Real plan[2], Saad-Filho and Mollo (2002) observe that inflation and GDP growth are negatively related in the economy of Brazil. GDP growth was a high at 7.3% between 1949 and 1980, equalling 5.8% growth in GDP per capita. However, beyond 1980, GDP growth fell to 1.8% with a corresponding 0% growth in GDP per capita.

Inflation on the other hand increased from 20% in 1972 to about 5000% in the mid of 1994 (Saad-Filho and Mollo, 2002). This is evidence of the fact that hyperinflation, or very high inflation rates are harmful to growth. Considering the fact that Ghana has over the years moved from a period of very high inflation rate to a relatively very low inflation rate over a period of time, it is imperative to study the effect of such inflation rates. The Real plan was aimed at stabilizing inflation in Brazil and achieved this goal to a large extent having reduced inflation significantly. However, the other benefits of the plan were not fully realized, and a major weakness posed was the fact that it depended heavily on finance from foreign sources.

Recent Studies have also added to the literature on inflation and growth. In an empirical analysis of the impact of inflation on economic growth, Kremer, Bick & Nautz (2009) identified a negative relationship between the two variables. Using panel data for 124 countries from 1950-2004, Kremer, Bick & Nautz (2009) conclude that inflation rates

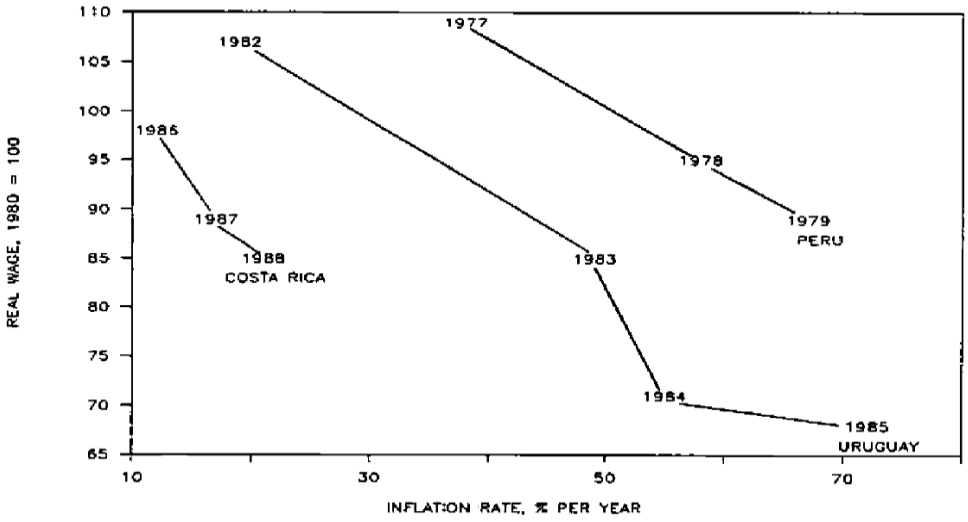
[2] The Real Plan, as explained by Saad-Filho and Mollo (2002) was an attempt to reduce Brazil's very high inflation rates. It was developed after 6 years of research and implemented in 1994. The approach was to de-index the Brazilian economy and liberalise trade and capital accounts of balance of payments. The plan was successful and reduced inflation to 5 percent and below, from 5000%. However, it was highly dependent on foreign financing. The consequences were increase in income inequality and the development of sharp social conflicts in Brazil in the medium to long term.

of 17% or higher negatively affects growth in non-industrialised countries and rates below 17% were insignificant. In addition, there was no evidence found of growth-enhancing effects of inflation over the entire period of study as some theories have suggested. A similar study was done by Ayyoub, Chaudhry & Farooq (2011) for the Pakistan economy. Ayyoub, Chaudhry & Farooq (2011) used a time series data from the period 1972-3 to 2009-10 and analysed the data using the ordinary least squares method. They described the relationship between inflation and GDP growth as negative and significant as well, setting the threshold at 7%.

2.3 Inflation and Poverty

Inflation also affects standard of living by its effect on poverty. The impact on inflation on poverty can be identified through its effect on real wages (Cardoso, 1992). Cardoso (1992) assessed that nominal wages fail to increase as fast as prices do in times of rising inflation. Based on this analysis, the relationship between inflation and poverty is deemed direct or positive. A study by Cardoso (1992) on Latin America gave evidence of a negative relationship between inflation and real wages for the period of 1977-1989 as shown in the figure below:

***Figure 2.6*: Relationship between Inflation and Real Wages for Selected Countries**.



Source: Cardoso, E. (1992). Inflation and Poverty. NBER Working Papers Series

Figure 2.6 above presents information from the study by Cardoso (1992) and shows evidence of the negative relationship between real wages and inflation rate as put forward by the author. Consequently, poverty increases with high inflation since real wages are reduced.

Azid et al (2012) studied the effect of inflation in the context of rising food prices on poverty in the Pakistan economy having made the observation that increasing global food prices is a leading cause of poverty in the world. Using a simple regression analysis, Azid et al (2012) however concluded that food prices have not been a key component of poverty in Pakistan. This they explained as being due to more net producers in agriculture than net consumers leading an insignificant impact of food prices on poverty since the numerous net producers gain in times of rising food prices. Agriculture is also a significant sector in Ghana. However, intense competition from imports restricts the benefits that come with increasing domestic output like the case of Pakistan. This leads to a profound impact of the global hike in food prices and worsens poverty in Ghana as a huge proportion of income earned by the poor is spent on food (Food and Agricultural Organisation of the United Nations, 2011).

Overall, there has not been one definite relationship between inflation and standard of living identified so far. Various studies done on the subject have yielded mixed conclusions on the subject matter: there is evidence of no correlation between the two variables; there is evidence of correlation between the two variables at certain thresholds, etc. The context in terms of the countries understudy also influenced the outcome of various analyses. For instance as seen in Bruno and Easterly's (1995) work, the relationship between inflation and GDP per capita growth became more evident when developing countries were mostly used in an analysis using a smaller or reduced sample. Also, Azid et al's (2012) study on Pakistan suggests that inflation in the form of

high food prices benefits the country. Such observations make this study very relevant as it puts a very important issue, which is how changes in inflation affects standard of living of people, in a specific context – Ghana, and adds to the literature.

2.4 Theoretical Framework

The origin of the theory of inflation as the end result of increasing money supply can be derived from a series of events which have occurred dating as far back as the 17th century (Blaug, 1996). Money had very little and close to a negligible economic importance at the time. Increasing money in circulation was seen as a driving force of the economy in terms of promoting growth and output. John Law, in his paper titled *Money Stimulates Trade,* offers a good insight into this era explaining that increasing money supply would only lead to a slight increase in prices and rather result in significant increases in supply, also output; a theory which is very contrary to the quantity theory of money (Blaug, 1996). This was followed by Cantilon's expansion in the 18th century of the theory explaining that increase in money supply will not only increase price levels, but will also alter the structure of prices (Blaug, 1996). Facing several oppositions, these theories have faded away.

A standard theory originating from the 19th century explains that money supply is directly related to price levels all other things held constant (Blaug, 1996). Today, two dominant theories exist to explain inflation. These are the quantity theory of money and the Philips Curve. The quantity theory of money indicates increase in the supply of money as a driving force of high price levels (inflation) in the economy, a case common to developing countries. The Philips Curve, alternatively, shows the relationship between inflation and unemployment. Unemployment is one good measure of welfare. Unfortunately, the variable is not used in this study as a result of unavailability of information about unemployment. These two theories put this study in context. With

respect to the quantity theory of money, this study has explained the source of inflation in developing countries as increase in money supply. The Philips Curve also models a relationship between inflation and standard of living (measured by unemployment).

2.4.1 Quantity Theory of Money Explanation of Inflation

The quantity theory of money puts forward a direct relationship between money supply and the general price level in an economy. The theory is simplified into a simple equation, MV=PT. M in this equation is the money stock, V connotes the velocity of circulation of money, P is the general price level and T represents the number of transactions (Pass, Lowes & Davies, 2005). Thus, the total money expenditure on goods and services (MV) is held equal to the monetary value of goods and services that are produced in the given period (Pass, Lowes & Davies, 2005). The quantity theory of money can be summed up in Milton Friedman's quote; that "Inflation is always and everywhere a monetary phenomenon (Friedman & Schwartz, 1971)." Therefore the price level rises proportionally with increases in money supply. For the quantity theory of money to hold, velocity is held constant, real output is independent of money supply, and causation goes from money to prices (Colander, 2010).

2.4.2 The Philips Curve Explanation of Inflation

The Philips Curve, a reflection of the short-run aggregate supply curve, illustrates the trade-off between inflation and unemployment such that government attempt to reduce unemployment leads to an expansion in aggregate demand which leads to a general increase in price levels with supply held constant. Therefore, inflation and unemployment tend to move in opposite directions (Mankiw, 2003). The Philips Curve is used as a relevant theory in this study although such comparison is almost unavailable in developing countries because of lack of data on unemployment. This is because growth is inherent in reduction in unemployment. Thus in the context of this research, the study assumes low unemployment to be an indicator of improved welfare or standard

of living. The Philips Curve therefore establishes a theoretical relationship between inflation and standard of living. The Philips Curve is illustrated below:

***Figure 2.7*: The Philips Curve**

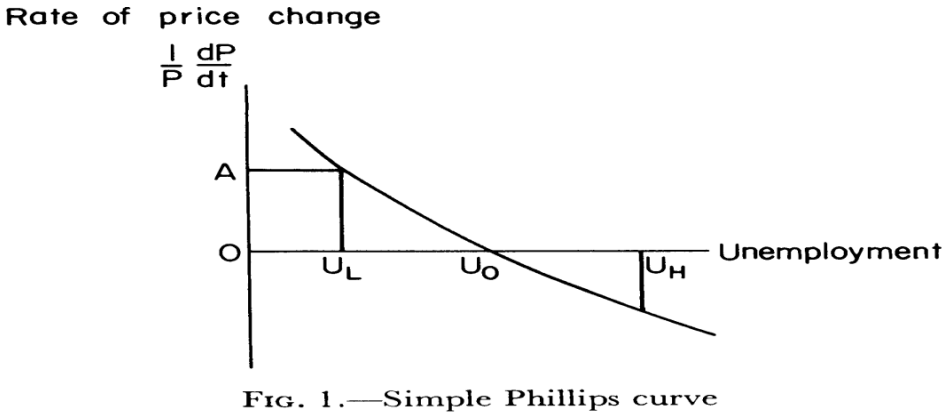


FIG. 1.—Simple Phillips curve

Source: Friedman (1997). Noble Lecture: Inflation and Unemployment

The Philips Curve above depicts the stable relationship between inflation and unemployment with both variables heading in opposite directions. The graph above therefore explains that, high inflation leads to the existence of more jobs and therefore reduces unemployment. The opposite is also true so that low inflation leads to few jobs and therefore high unemployment in the short run. The stable relationship exists such that as policy makers choose between different unemployment levels: U_L, U_o and U_H, the corresponding inflation rate level of A, 0 or (<0) is the consequence. In the context of this study, the Philips Curve therefore suggests that high inflation is associated with improved standard of living in the short run.

Despite this widely accepted description of the Philips Curve, recent evidence has shown that the curve could actually be positively sloped as recent high inflation trends have been accompanied by high levels of unemployment with evidence from the oil crisis and some independent forces that push unemployment upwards in the presence of a high inflation (Friedman, 1977). Also, the UK has recorded a period of low inflation and low unemployment arising mainly as a result of the increasing flexibility of

the labour market which has helped reduce the natural rate of unemployment (Pass, Lowes & Davies, 2005). Considering the fact that employment can be directly linked with growth, high unemployment can mean low growth. If the Philips Curve in modern times demonstrates that inflation is positively related to unemployment as mentioned in other literature, then high inflation leads to high unemployment, which is an indication of low growth. This therefore suggests an inverse relationship between inflation and growth which conforms to a lot of the observations in the literature discussed.

Application of the exact Philips Curve hypothesis to Ghana can be rather difficult as data on unemployment in Ghana is rare. As a result, although unemployment can also be used as a good measure of standard of living, which will typically model the Philips Curve, lack of relevant data does not permit such a study. Therefore, this use of trends in real GDP per capita and HDI in view of changing levels of inflation is essential in analysing the impact of inflation on standard of living in Ghana as good indicators of standard of living.

3 METHODOLOGY

3.1 Overview and Justification of Research Method

Methodology is an important aspect of any study since it shows how the proposed research is to be carried out. It therefore occupies a critical and integral part of the research process (Sotirios & Sarantakos, 2005). This study employed a combination of descriptive and correlational studies. Thus, the research sought to systematically describe the status of standard of living in relation to changes in the level of inflation. It is also correlational because it probed into the relationship between inflation and welfare of people in Ghana and seeks to explain the relationship as well. Therefore the study utilised a quantitative framework. This follows the fact that the research was interested in measurement, objectivity, validity and an explanation of phenomenon to detect and explain the relationship between the variables in question.

The quest of this study is embedded in the main research question which is: **What is the implication of changing rates of inflation on standard of living in Ghana?** Thus, this research focused on determining how standard of living of Ghanaians is affected by changing levels of inflation. The study employed statistical analyses which were in the form of two simple regression models to objectively determine the response, if any, of standard of living to changes in the level of inflation. Regression is one of the main methods which has been used to describe the similar relationships evident from the literature review in the case of Bruno and Easterly (1995), Barro (1995), among others. Having explained the relationship between changing levels of inflation and standard of living, a sensitivity analysis were conducted to determine how sensitive welfare is to changing levels of inflation in Ghana. The quantitative framework was therefore suitable in order to guarantee the objectivity and validity, and also ensure that the analysis can be replicated.

3.2 Discussion of key Variables

The key variables for the measurement aspect for this research are inflation and standard of living of Ghanaians. As defined earlier, inflation refers to the general increase in prices levels. The measure for inflation in this study is the percentage change in Consumer Price Index (CPI) which is the measure of inflation used in Ghana currently.

Standard of living was determined using two (2) variables: which are real GDP per capita and the Human Development Index (HDI) also mentioned previously in the study. The study therefore measured the implications of percentage changes in the CPI on real GDP per capita and HDI with respect to Ghana. Real GDP per capita was used as a measure of standard of living because although not the best measure of standard of living, it has been widely used in different studies. Using real GDP per capita as a measure of standard of living in this study will enable findings of this research to be easily comparable to other research findings. The HDI has evolved as a better measure of standard of living and also captures poverty. The HDI was therefore used in this study as a better measure of standard of living which will add to the validity of the research findings.

3.3 Scope of the Research

The context of this study was Ghana. Ghana is a lower middle income country in West Africa with a population of over 24million according to the 2010 population census. Like many African countries, Ghana is rich in natural resources including but not limited to gold, cocoa and the recently found oil. Oil exploration is therefore currently on-going with measures in place to hedge against the resource curse. The exploration of oil is also expected to contribute significantly to the country's GDP. Thus, the country attracts many potential investors who invest in the various sectors. Ghana also has good rankings with regards to economic freedom and thereby is known to be a good place to

do businesses in Africa (The Heritage Foundation, 2012). It is therefore not surprising that the Ghanaian economy is projected to be one of the fastest growing economies in Africa in the coming years. The focus on Ghana as a whole was made possible because the quantitative analysis takes data that reflects the entire Ghanaian population.

3.4 Description of General Population and Sample Area

The heart of this study is the welfare of the Ghanaian population and how it is affected by the changing levels of inflation. Therefore the population area was also the sample area which was Ghana in general. This is because of the use of inflation rates, real GDP per capita and HDI values which are annual averages that reflect the status of the entire population of the country. Thus, it is important to note that the population area equals the sample area since data on inflation, GDP per capita and HDI reflect the entire population. The sample was therefore the same as the population to a large extent with the only difference in the two being the quantity of data available and the quantity of data used in the study.

3.5 Types and Sources of Data

This study employed secondary data in two forms: research done by others as described in the literature review and annual data for the variables under study. Research done by others was obtained from various academic journals while annual data for the variables under study was obtained from the World Databank mostly and the Central Intelligence Agency (CIA) World Factbook where necessary. These sources were used because data from these identified sources are accepted internationally and thus enhance the credibility and reliability of the study as opposed to data generated within the country which can be subject to a greater degree of scrutiny.

3.6 Sample Size

The sample size for the research was annual data for the variables for the period of 1980-2012. The dataset starts from 1980 because data on HDI for Ghana from the

World Databank starts from this year. Therefore although GDP per capita and inflation both have annual data dating far back than this period, the need for consistency in analyses gave rise to the choice of period under study.

3.7 Theory and Model Section

Being a quantitative study, this research made use of theories and models. Regression analyses on information gathered from the identified sources were performed in order to determine the correlation among the variables, if any. Two simple regression models were used for this study with the independent variable being inflation and the dependent variables being real GDP per capita and HDI. Therefore, the explanatory variable, inflation, was regressed on the response variables, real GDP per capita and HDI, in two separate models. The equation for the model is:

$$Y_i = a + bX_i + e$$

Y_i connotes the dependent (response) variable for each year of observation which is standard of living indicated by real GDP per capita or HDI; X_i connotes the independent (explanatory) variable for each year of observation which is inflation. ***a*** and ***b*** are the parameters of regression: the intercept and slope of the equation respectively. ***e*** represents the error term of the equation; it was added to make room for other variables that may influence the regression analysis which were not taken into consideration in this study. The main tool used to carry out the regression analyses was Microsoft Excel.

The key assumptions that are necessary for this regression analysis to be valid are:

1. The relationship between X and Y is linear
2. The values of X have a random probability distribution
3. The error term has a zero expected value
4. The error term has a constant variance for all observations

5. The random variables are statistically independent
6. The error term is normally distributed

Source: Pindyck, R. S., & Rubinfeld, D. L. (1998). *Econometric Models and Economic Forecasts*. 4th ed.

The regression analysis described above helps to determine the theoretical relationship between inflation and standard of living as well as the strength of the relationship.

In order to determine the sensitivity of the standard of living to inflation in the study, a measure of elasticity was used. Thus, by checking the responsiveness of standard of living to inflation, the sensitivity of standard of living to inflation was determined. Elasticity was calculated in two ways: one at the means of the datasets, the other at five different levels of inflation and the corresponding standard of living (real GDP per capita or HDI). Thus, aside determining how sensitive standard of living was to inflation generally, elasticity as various levels was to help determine the effect on inflation on standard of living at different inflation levels.

The elasticity equation is given as:

$$\boldsymbol{E_{x,\,y}} = \frac{Change\ in\ y\ /\ Level\ of\ y}{Change\ in\ x\ /\ Level\ of\ x}$$, which can be rewritten as:

$$\boldsymbol{E_{x,\,y}} = \frac{Change\ in\ y}{Level\ of\ y} * \frac{Level\ of\ x}{Change\ in\ x}$$

$$\boldsymbol{E_{x,\,y}} = \frac{Change\ in\ y}{Chnge\ in\ x} * \frac{Level\ of\ x}{Level\ of\ y}$$

But $\frac{Change\ in\ y}{Chnge\ in\ x}$ = slope (given as b, the regression coefficient)

Thus, $\boldsymbol{E_{x,\,y}}$ = b * $\frac{Level\ of\ x}{Level\ of\ y}$

Thus, the elasticity equation is also a two-variable equation ***(x, y)*** where ***x*** is the independent variable which is inflation, and ***y*** is the dependent variable which is standard of living (given as real GDP per capita or HDI) in the context of this study.

3.8 Limitations

There are two key limitations as far as this study is concerned. These are:

i. Inadequacy of sample size

This is a quantitative study which employed descriptive and correlational research designs. A significant sample size is relevant to establish relationship. However, data for only the period of 1980-2012 was used and this has the tendency to influence the results obtained.

ii. Measurement error

The secondary data that was used for this study consist of information that has undergone prior measurement. Therefore any measurement error inherent in the primary source of measurement will have an effect on the results obtained from the research.

3.9 Ethical Consideration

Secondary data obtained from the various sources were used as obtained from the sources and were not manipulated for the sake of conformance to the models employed in the study. Results were also presented as revealed by the analyses. Interpretations and conclusions were done based on the results obtained from the analyses and are free from the researcher's personal opinions.

4 FINDINGS, DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

The chapter demonstrates how the various objectives of this research are achieved. It also draws on other literature to show how similar or different this research is to previous studies and thus, highlights the contribution this study makes to literature.

As mentioned earlier, this research was mainly quantitative in nature. The structure of this chapter is as follows: regression and sensitivity analyses are performed on the data to determine the theoretical relationship between inflation and standard of living, and the sensitivity of standard of living to inflation respectively (these are two critical objectives in this study), followed by a discussion of the results obtained from the analyses.

4.2 Regressing inflation on real GDP per capita

This section focuses on the regression analysis between inflation and real GDP per capita. All relevant details relating to the regression of these two variables are presented in this section.

4.2.1 Data issues

The first analysis done in this study was a regression of inflation on real GDP per capita. One factor taken into consideration was that changes in inflation will not immediately translate into real GDP per capita. Thus, a time lag of 1 year was introduced. The study therefore assumed that a change in inflation in a particular year translates into real GDP per capita the following year. Values for inflation in given years were thus, matched against corresponding real GDP per capita values in the following year. Based on this provision, inflation rates from 1979-2011 were regressed on GDP per capita figures for the 1980-2012 period.

Secondly, annual data obtained for the variables have been finalised and published with the exception of data for 2012. Real GDP per capita for 2012 was estimated from a provisional real GDP figure. To obtain real GDP per capita, the real GDP value obtained was divided by the estimated 2012 population of Ghana; the result was further divided by the end of year Ghana cedi exchange rate to the dollar. Thus the real GDP per capita value for 2012 was not obtained from the World Databank Indicators (WDI). It is therefore not unexpected that the confirmed figure to be released in the future could be different from the computed figure.

There were a few outliers in the datasets for both inflation and real GDP per capita. These outliers represented extreme points in the plot of inflation against real GDP per capita. The inflation dataset had two outliers while the real GDP per capita dataset had one outlier. Analyses were performed on the entire datasets for the two variables (outliers inclusive) as well as the entire datasets after all outliers had been removed. There were differences in the outcomes from both datasets; however, those differences were not significant. Consequently, the analyses and discussion of results presented here are based on the outcomes from the datasets that did not include outliers. This is because the presence of outliers could yield misleading results. However, although this section is based on the data set without outliers, results from analysing datasets both with and without outliers have both been provided in the appendix for the interested reader.

4.2.2 Summary of Data used

The summaries for the data sets used for inflation and real GDP per capita are presented below. These summaries mainly comprise descriptive statistics which have been used to provide a background understanding to the data used for the analyses.

4.2.2.1 Inflation

***Table 4.1*: Summary of Data**

Inflation	
Descriptive Statistic	*Value*
Mean	25.644
Standard Error	2.55098
Median	24.7178
Standard Deviation	13.9723
Kurtosis	0.02059
Skewness	0.90739
Range	49.4054
Minimum	10.0561
Maximum	59.4616
Confidence Level(95.0%)	5.21733

Using a confidence level of 95% as seen from the table above, the average inflation rate (mean) is 25.64%. The median value of 24.72%, which is somewhat not far away from the mean, suggests that the dataset for inflation approximately approaches a normal distribution. The value of kurtosis being 0.02 distorts the assumption of a normal distribution considering the fact that 0.02 is significantly lower than the standard normal distribution kurtosis value of 3 (Lewis-Beck, Bryman and Liao, 2004). However, 0.02 is still within the range of +2 to -2 which describes a normally distributed dataset (Lewis-Beck, Bryman and Liao, 2004).

Additionally, the skewness value of 0.91 is not too far away from zero to suggest a normal distribution of the dataset. Therefore overall, the dataset for inflation can be said to approximate a normal distribution. This fulfils one of the assumptions outlined in the methodology section: the values of the independent variable (which is inflation in the context of this study) follow a random probability distribution. The standard deviation gives the information that values in the dataset are spread within ±14.10 deviations about the mean.

4.2.2.2 Real GDP per capita

***Table 4.2*: Summary of Data**

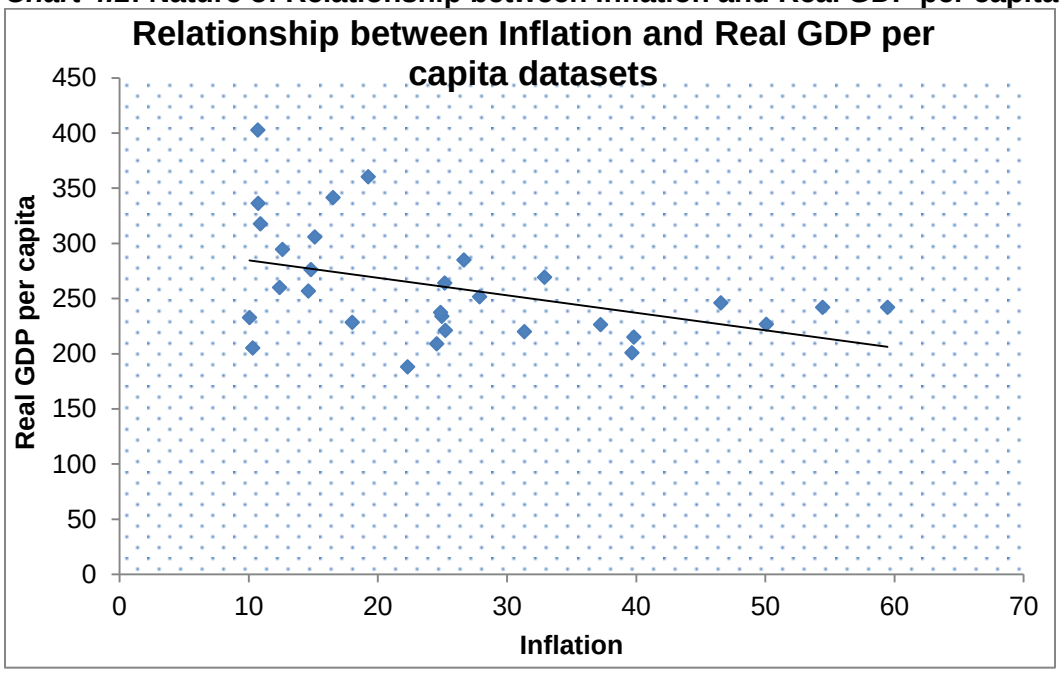
Real GPD per capita	
Descriptive Statistic	*Value*
Mean	259.896
Standard Error	9.34583
Median	244.128
Standard Deviation	51.1892
Kurtosis	0.87462
Skewness	1.10638
Range	214.547
Minimum	188.149
Maximum	402.695
Confidence Level(95.0%)	19.1144

Once again, using a confidence level of 95%, the average real GDP per capita is 259.90USD while the median value is 244.13USD as seen from the table. The sample data are dispersed within ±51.19 deviations around the mean. The data is more peaked relative to that of inflation with a kurtosis value of 0.87. The data sample for real GDP per capita also gives the indication of a right skewed data with a skewness value of 1.11.

4.2.3 Nature of relationship between the variables

As mentioned in the methodology section, this study makes use of two simple linear regression models. The model will not be appropriate if the variables under study bear no linear relationship. Therefore a simple test of the relationship between inflation and real GDP per capita data was conducted before the regression analysis. The statistical tool used to test for the nature of the relationship is the scatter plot. Aside showing whether a linear relationship exists between variables, the scatter plot is also useful for detecting any problems that could nullify correlations that could be drawn from the two variables. The scatter diagram is showing the relationship between inflation and real GDP per capita is presented below:

***Chart 4.1*: Nature of Relationship between Inflation and Real GDP per capita**



From the scatter plot displayed above, there is no evidence of a curvilinear relationship. In addition, the points distributed around the trend line, or the line of best fit, do not give an indication of the absence of a linear relationship. It is therefore established that a linear relationship exists between the inflation and real GDP per capita.

4.2.4 Regression Results

***Table 4.3*: Regression of Inflation on Real GDP per capita**

Regression Results	
Regression Equation	-1.58x + 300.51
Multiple R (Correlation)	0.4323
Coefficient of Determination	0.1869
Total Sum of Squares (SST)	75989.6866
Regression Sum of Squares (SSR)	14202.7604
Residual Sum of Squares (SSE)	61786.9261
Test of Significance:	
Critical Value	4.1960
Test Statistic	6.4363

The regression equation is given as y = -1.58x + 300.51 as seen from the table above. The slope of -1.58 indicates that for every percentage increase in inflation, real GDP per capita reduces by 1.58USD. Thus, there is an inverse relationship between inflation and real GDP per capita. The extent of the negative relationship can be explained further by the multiple R (correlation) value of 0.4323. Thus, the strength of the inverse relationship between inflation and real GDP per capita is 43.23%.

The coefficient of determination (R-square) is used to determine how much variation in y is attributable to x. In the context of this analysis, R-square explains how much, or what percentage, of variation in real GDP per capita can be attributed to changes in inflation rate. From the regression analysis, the coefficient of determination is 0.1869 indicating that 18.69% of the changes in real GDP per capita can be attributed to inflation. Explained differently, comparing the explained variation (SSR) value of 14202.76 to the total variation value of 75989.69, it is apparent that inflation accounts for 18.69% changes in real GDP per capita.

Using a statistical hypothesis test, the significance of the slope obtained from the regression analysis determined. A one-tailed hypothesis test is used to test the significance of the slope of the regression equation. The null hypothesis (H_0) and alternate hypothesis (H_1) are given below:

H_0 = There is no relationship between inflation and real GDP per capita

H_1 = There is a significant statistical relationship between inflation and real GDP per capita

The F-test is used. A confidence level of 95% gives an alpha value of 0.05. The F value given alpha and the degrees of freedom is given as 4.1960 (thus, $F_{(0.05,\ 1,\ 28)} = 4.1960$) which is also the critical value. The test statistic from the regression analysis is 6.4363. This value (6.4363) falls within the area of rejection since it is greater than the critical value; therefore the null hypothesis is rejected with the reason that there is sufficient evidence of a significant statistical relationship between inflation and real GDP per capita.

4.2.5 Robustness of Regression Results

This section checks the robustness of the regression analysis and thus the results obtained from the regression analysis. It is necessary to prove the robustness of the model adopted for this study in order to determine that the model fits the data. Assessing the robustness of the model adopted is also a way of assessing the validity of the regression results. Some fundamental assumptions underlying the simple linear regression model: linearity, equal variance of error terms and independence are tested using the residuals from the regression analysis. Recall that the assumption of a random normal distribution of x (inflation dataset) has been checked for and confirmed under the summary of dataset for inflation.

***Chart 4.2*: Test of Linearity**

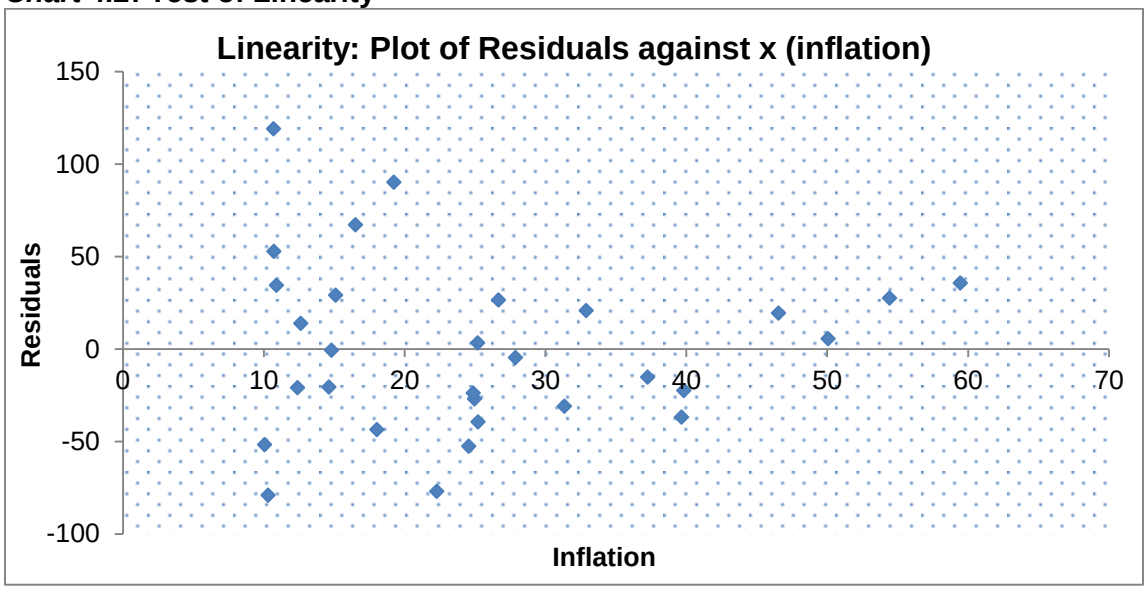


***Chart 4.3*: Test of Equal Variance**

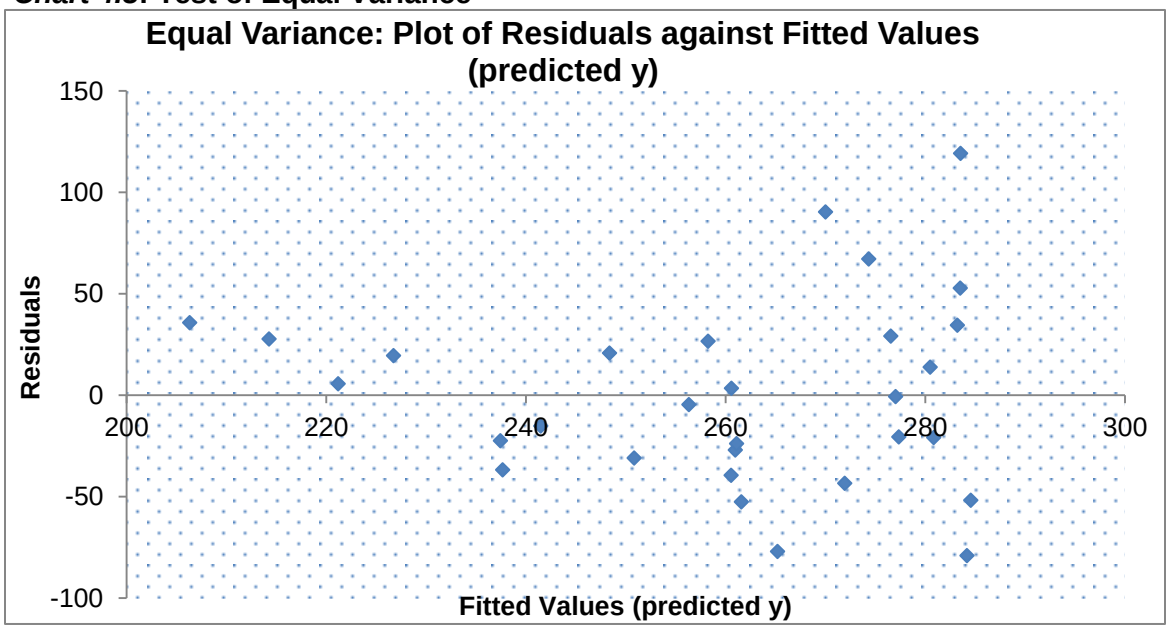
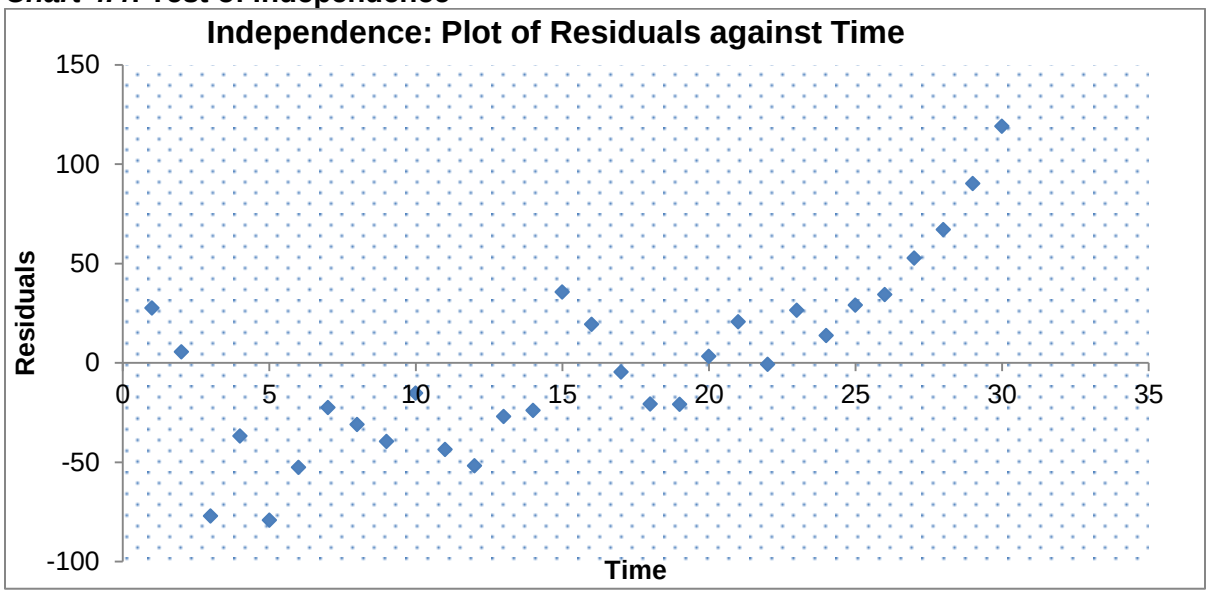


***Chart 4.4*: Test of Independence**



The above charts refer to various tests ran for the model with the aim of assessing the fit between the data and the regression analysis. With regards to linearity (Chart 4.2), the residuals for the regression are plotted against the x values which constitute inflation in this study. Ideally, data points should spread around the horizontal line (x=0) with no evidence of a pattern. As seen from the chart above, there is no observed pattern or systematic curvature in the plot of the residuals against x. This proves the existence of a linear relationship between inflation and real GDP per capita, x and y values respectively, as used in the research.

Equal variance of errors is tested by plotting residuals against fitted (predicted) y values as per the equation obtained from the model as shown in Chart 4.3. Preferably, the data points above and below the horizontal line (x-axis) should be of equal width on the whole. As seen from the plot of residuals against fitted values above, most of the data points fall with ±50. Residuals with values than ±50 fall mostly fall within ±100. Therefore grouping the residuals, it can conveniently be inferred that residuals fall within ±100. Thus, the assumption of equal variance is apparent.

Finally, the independence of errors is tested by plotting residuals over time illustrated in Chart 4.4. This test is critical in the study because data observed over time for both inflation and real GDP per capita was used for the study. Independence of errors is established if no pattern is observed from the plot. As seen from the plot of residuals over time, there are no consistent patterns observed at time intervals. Although residuals towards the latter end (recent years) are considerably higher than the residuals at the beginning (past years), there is evidence of a random rise and fall of data points on both sides. Thus, to some extent, independence is present although it may be only partial.

4.3 Regressing Inflation on HDI

This section presents information on regression analysis performed on inflation against HDI.

4.3.1 Data Issues

Once again, it is understood that changes in inflation will not influence HDI in the same years. Therefore, a lag of 1 year was also introduced in the analysis such that inflation values in a given year are regressed on corresponding HDI values in the following year. Consequently, data used comprises inflation data from 1979 – 2011 and HDI data from 1980-2012.

Further issues relating to data for this regression was the fact that HDI values are mostly recorded at 5-year intervals as obtained from the main source of data for this analysis – World Databank. Instead of computing 5-year averages for inflation data and performing a regression analysis of inflation averages on the HDI data, it was assumed that HDI values are constant for 5 years. For instance, it was assumed in this study that HDI values for 1981, 1982, 1983 and 1984 are the same as the HDI value for 1980. This follows that the HDI value recorded for 1985 were also used for 1986-89 and so on.

Furthermore, there was also the issue of outliers in the data collected and used for this analysis. Just as done in the regression of inflation on real GDP per capita, analyses were performed on entire datasets with and without outliers. However, results and discussions presented are based on analyses of datasets without outliers. This is because although differences in the results for the two data sets (with and without outliers) are only marginal, the presence of outliers could influence the outcome of analysis and thus mislead the research in terms of the results obtained. However, the results obtained for both datasets are presented in the appendix.

4.3.2 Summary of Data used

Since inflation data for the same period was used here as in the first regression analysis, the summary for the inflation data is the same as earlier reported. Therefore, only a description for HDI values used in the regression is provided. The summary description of HDI data used is presented in Table 4.4 below:

***Table 4.4*: Summary of Data**

HDI	
Descriptive Statistic	*Value*
Mean	0.41201
Standard Error	0.00601
Median	0.42123
Standard Deviation	0.03291
Kurtosis	-1.0905
Skewness	-0.1169
Range	0.10373
Minimum	0.36346
Maximum	0.4672
Confidence Level(95.0%)	0.01229

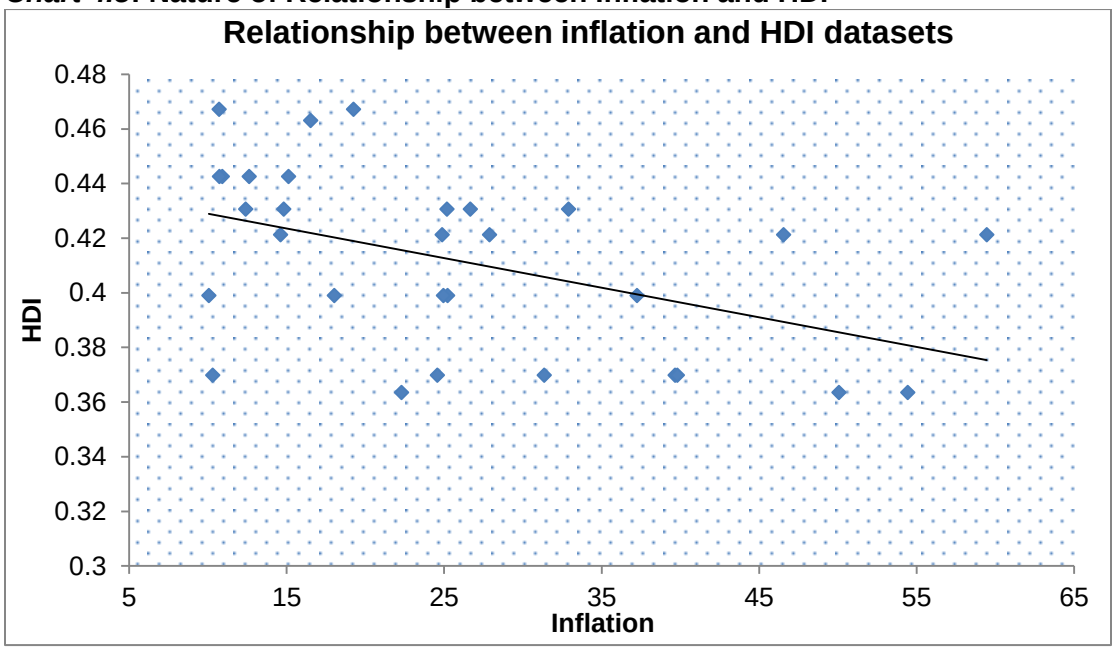
The mean for the HDI data analysed is 0.41 at a confidence level of 95%. The standard deviation value gives evidence that the HDI dataset is spread within ±0.03 deviations from the mean. The distribution of the HDI data is very likely to be flat evident

from a negative kurtosis value of -1.09. The skewness value of -0.1169 implies that the data is left skewed.

4.3.3 Nature of Relationship

This section also tests the relationship between the two variables even before regression was done. The idea was to determine the existence of a linear relationship between the variables in order to establish a regression analysis as fit for use. A scatter plot is used to describe this relationship. The scatter plot of the relationship between inflation and HDI is shown in the figure below:

***Chart 4.5*: Nature of Relationship between Inflation and HDI**



The scatter plot above illustrates a linear relationship between inflation and HDI evident from the fact that there is no curvilinear pattern observed.

4.3.4 Regression Results

***Table 4.5*: Regression of Inflation on HDI**

Regression Results	
Regression Equation	-0.0011x + 0.4398
Multiple R (Correlation)	0.4608
Coefficient of Determination	0.2123
Total Sum of Squares (SST)	0.0314
Regression Sum of Squares (SSR)	0.0067
Residual Sum of Squares (SSE)	0.0247
Test of Significance:	
Critical Value	4.1960
Test Statistic	7.5461

The regression equation is given as -0.0011x + 0.4398 as seen from the table above. This indicates an inverse relationship between inflation and HDI as a result of the negative slope of -0.0011. The multiple R gives a further explanation to the relationship; it explains that extent of the inverse relationship between inflation and HDI is 46.08%.

The coefficient of determination helps to explain how much influence inflation has on HDI. The value of the coefficient of determination (R-square) is 0.2123. This specifically means that inflation accounts for 21.23% change in HDI. With regards to total and explained variation (SST and SSR respectively) which is also another way of interpreting coefficient of determination, the regression results show that in an HDI total variation of 0.0314, 0.0067 can be attributed to inflation.

A statistical hypothesis test for the significance of the slope of -0.0011as per the regression analysis is done using a one-tailed hypothesis test. The null and alternate hypotheses are stated below respectively:

H_0 = There is no relationship between inflation and HDI

H_1 = There is a significant statistical relationship between inflation and HDI

Using an F-test for the one-tailed hypothesis test and assuming a confidence interval of 95%, the value of alpha is 0.05. The critical value reading from the F-distribution is the same as what was determined earlier since the degrees of freedom and alpha are the same. This critical value thus, is 4.196. The F-statistic is 7.5461 and which significantly higher than the critical value of 4.196. This means that the null hypothesis should be rejected leading to the conclusion that there is enough evidence of a significant statistical relationship between inflation and HDI.

4.3.5 Robustness of Regression Results

The robustness of the regression results is tested below. Once again, this is necessary to enhance the validity of the results obtained in the study. The assumptions tested for to determine the robustness of the regression model are linearity, equal variance and independence.

***Chart 4.6*: Test of Linearity**

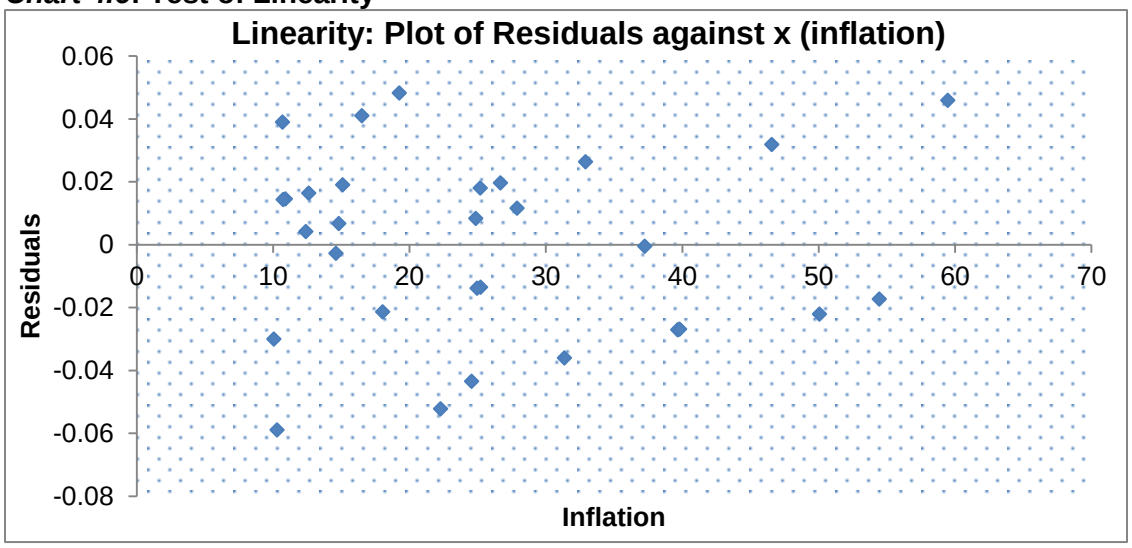


***Chart 4.7*: Test of Equal Variance**

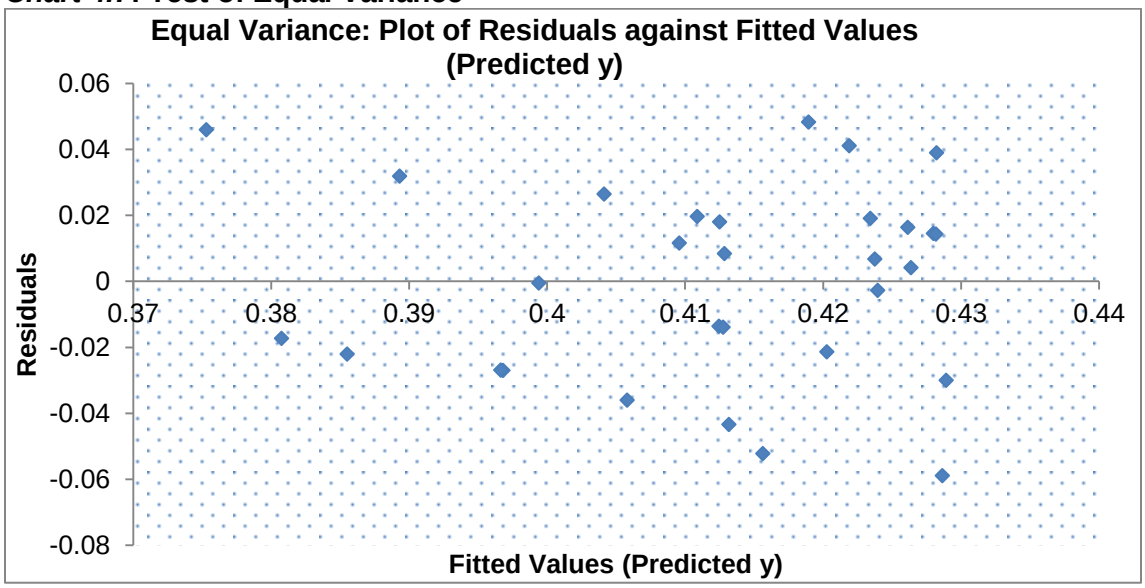


***Chart 4.8*: Test of Independence**

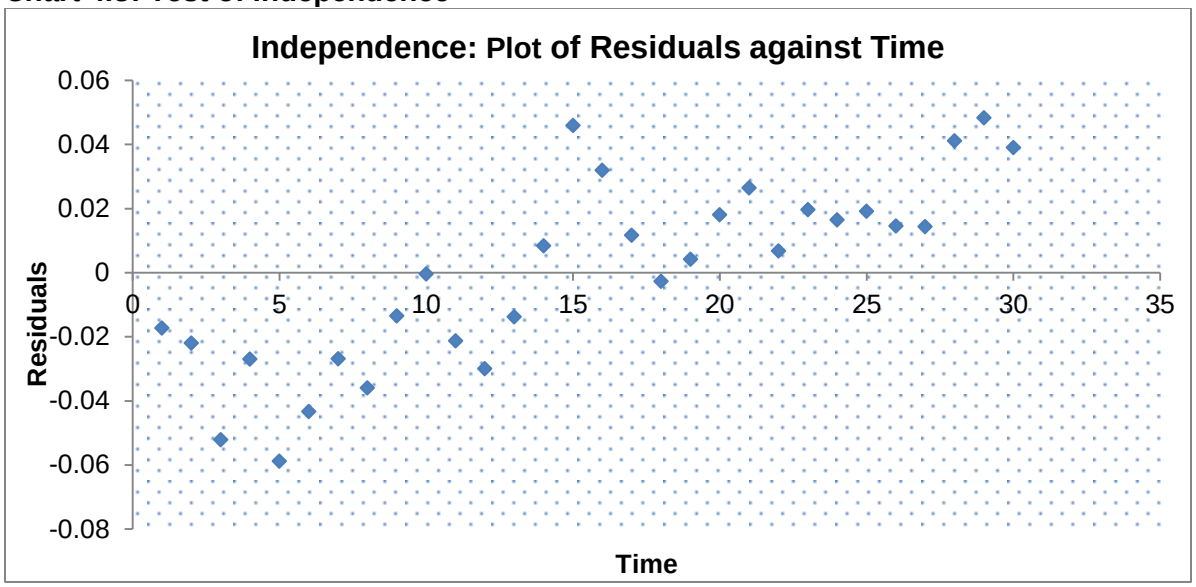


Chart 4.6 demonstrates the test for linearity with a plot of residuals against x (inflation). The relationship between x and y are linear, according to this plot, when there are no observed curvatures among the data points or any pattern whatsoever. As seen from the chart above, there is no evidence of any form of systemic curvature.

Additionally, the data points are random indicating the absence of any pattern. Thus, the linearity assumption holds for the regression model.

Chart 4.7 shows the test for equal variance of errors indicated by the plot of residuals against fitted or predicted values of y. As seen from the chart, there is evidence of equal variance to a significant extent as most of the data points fall within the range of ±0.413 as well as ±0.428. Thus, although a few data points appear to deviate from the range indicated, the assumption holds for this model to a very large extent.

The final check for robustness of the regression analysis between inflation and HDI is the check for independence using a plot of residuals against time. The rule of thumb is that there is independence when there is no observed pattern or unique behaviour of residuals over time. This assumption appears to be slightly violated as the data points plotted seem to be divided into positive and negative values with the division point at x = 14. Thus, y values are negative at x values below 14 and positive at x values above 14. However, this is not completely the case as there is evidence of a random behaviour at either side of the observed division (x = 14). Therefore this seeming violation can be conveniently ignored to some extent. On the whole, the assumptions tested for do hold. Consequently, the conclusion is that the regression model is robust.

4.4 Sensitivity analysis

Elasticity is computed to identify sensitivity of standard of living to changes in the level of inflation. Elasticity is calculated at the mean of the data points for both real GDP per capita and HDI in relation to how sensitive standard of living is to inflation on the whole. Calculations are also performed at intervals in the dataset to determine how standard of living behaves with respect to inflation at various levels.

Sensitivity of real GDP per capita to inflation at mean of data points:

Let x be inflation and y be real GDP per capita

Mean inflation (x) = 25.6440

Mean real GDP per capita (y) = 259.8959

Slope (b = regression coefficient) = -1.5839

Elasticity = b * $\frac{level\ of\ inflation}{level\ of\ real\ GDP\ per\ capita}$

Elasticity = $-1.5839 * \frac{25.6440}{259.8959}$

Elasticity = 0.1563(negative sign ignored)

Elasticity = 15.63%.

Sensitivity of HDI to inflation at mean of data points:

Let x be inflation and y HDI

Mean inflation (x) = 25.6440

Mean HDI (y) = 0.4120

Slope (b = regression coefficient) = -0.0011

Elasticity = b * $\frac{level\ of\ inflation}{level\ of\ real\ GDP\ per\ capita}$

Elasticity = $-0.0011 * \frac{25.6440}{0.4120}$

Elasticity = 0.0685 (negative sign ignored)

Elasticity = 6.85%

Sensitivity of real GDP per capita to inflation at different points in the data

The different points in the data used in this analysis were chosen in relation to inflation. Using the behaviour of inflation as a guide, the dataset was divided in six categories such that any unique behaviour of inflation is captured. To calculate the elasticity for each category, the highest value within the category was taken with the corresponding real GDP per capita; elasticity was thus computed. It should be noted here that corresponding real GDP per capita values relate to the following year for the chosen inflation value as a result of the time lag as explained earlier. The same slope (-1.5839) obtained from the regression analysis is used. The data used for computing the elasticity as well as the elasticity results obtained from computing the various points and the resulting chart are illustrated below:

***Table 4.6*: Sensitivity of Real GDP per capita to Inflation at interval of Data Points**

Intervals	***Inflation Value used***	***Value of corresponding real GDP per Capita***	***Elasticity***
Below 11	10.9152	317.7364	0.0544 (5.44%)
11.01 – 16	15.1182	305.7511	0.0783 (7.83%)
16.01 – 25	24.9598	234.0065	0.1689 (16.89%)
25.01 – 35	32.9054	269.2286	0.1936 (19.36%)
35.01 – 45	39.8151	214.9652	0.2934 (29.34%)
Above 45	59.4616	242.0583	0.3891 (38.91%)

Elasticity is computed for the same way as demonstrated in the computations at the mean of the data points.

***Chart 4.9*: Elasticity at various Data Points**

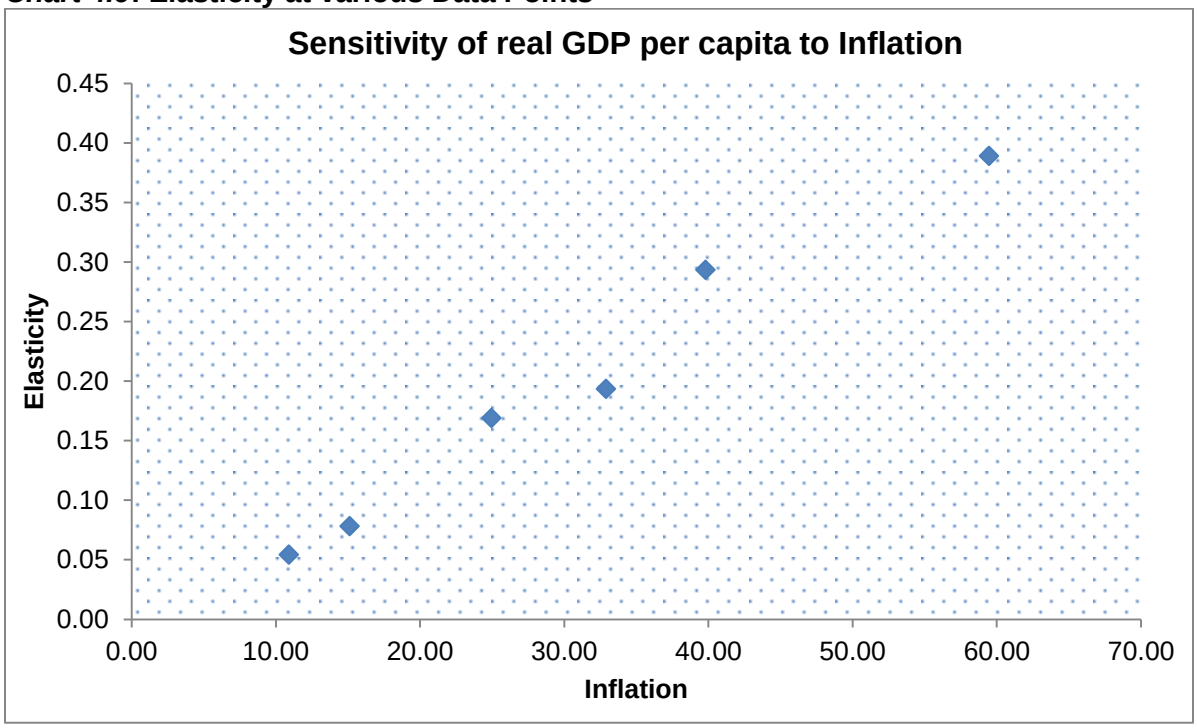


Chart 4.9 is a plot of elasticity against inflation using the data points for inflation and the elasticity results obtained from the elasticity computations at the intervals. From the chart above, it is evident that elasticity increases at higher levels of inflation. Therefore all other things being equal, the higher the inflation rate, the more sensitive GDP per capita is to inflation.

Sensitivity of HDI to inflation at different points in the data

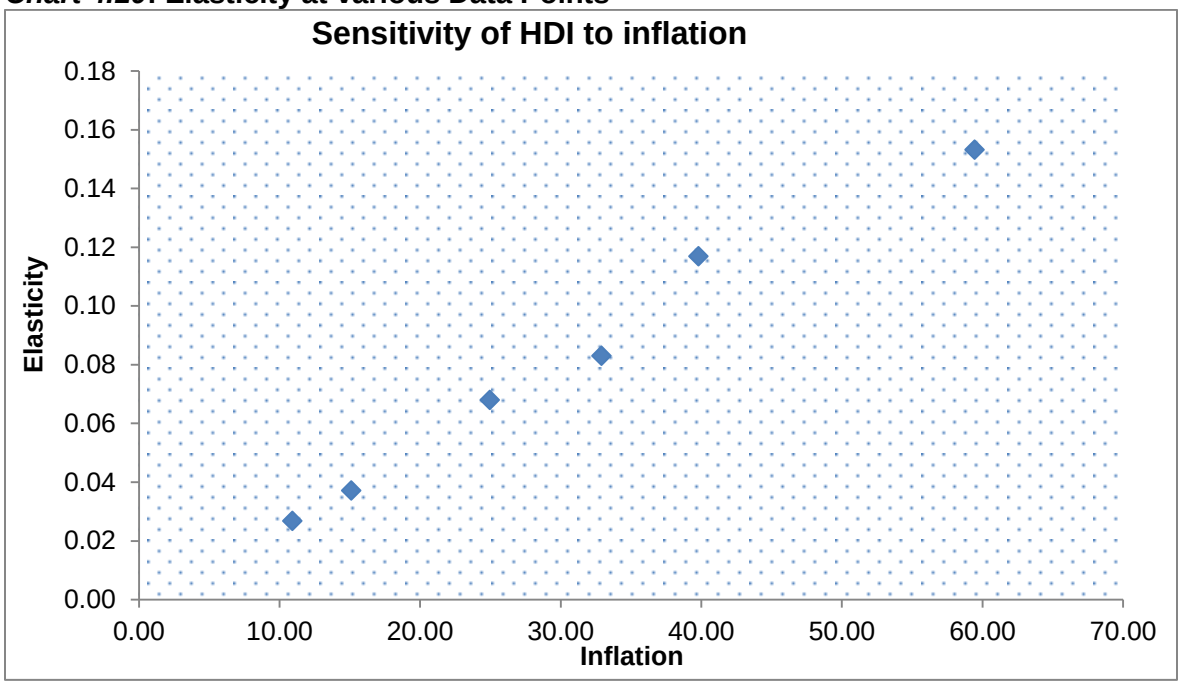
Elasticity is computed at different levels of determine sensitivity of HDI to inflation at different levels. The intervals for inflation were the same as used in earlier in the computation on real GDP per capita to inflation at different data points. The various data points used, elasticity results obtained and the resulting chart are shown below:

***Table 4.7*: Sensitivity of HDI to Inflation at interval of Data Points**

Intervals	*Inflation Value used*	*Value of corresponding HDI*	*Elasticity*
Below 11	10.9152	0.4425	0.0271 (2.71%)
11.01 – 16	15.1182	0.4425	0.0376 (3.76%)
16.01 – 25	24.9598	0.3989	0.0688 (6.88%)
25.01 – 35	32.9054	0.4306	0.0841 (8.41%)
35.01 – 45	39.8151	0.3698	0.1184 (11.84%)
Above 45	59.4616	0.4212	0.1553 (15.53%)

Elasticity is computed for the same way as demonstrated in the computations at the mean of the data points.

***Chart 4.10*: Elasticity at various Data Points**



The plot above shows the relationship between inflation and elasticity at the various data points used in computing the elasticity in table 4.7. It is obvious from the chart that elasticity increases at higher levels of inflation, similar to what was observed in the elasticity analysis of real GDP per capita. Thus, all other things being equal, HDI increases in sensitivity to inflation as inflation soars.

4.5 Discussion of Results

Over the years, research has been conducted on the effects of inflation on: GDP, GDP growth, GDP per capita growth, etc. to identify the relationship between inflation and these variables. However, there is lack of a common conclusion about the effect, if any, of inflation on these variables in the literature. Furthermore, such studies done in relation to specific countries appear to arise at different conditions indicating the likely country-specific relevance of the results obtained in the literature.

Even in a single specific country, it is often difficult to deduce what the figures (inflation rates) convey as they are interpreted or misinterpreted from time to time to suit political ends as is done in Ghana. Using real GDP per capita and HDI as indicators of standard of living and inflation as determinant of standard of living, regression and sensitivity analyses have been performed to identify how standard of living behaves with respect to changing levels of inflation. The primary objectives of study were to identify the theoretical relationship between inflation and standard of living; as well as determine the sensitivity of standard of living to inflation. The results obtained from the analyses are subsequently discussed.

The regression analyses revealed a significant negative statistical relationship between inflation and standard of living: in the case of real GDP per capita, the regression equation was -1.58x + 300.51; while the regression of inflation on HDI yielded the equation -0.0011x + 0.4398. In testing for the significance of these slopes using statistical hypothesis tests, the null hypothesis that there is no relationship between inflation and standard of living was rejected in both cases. Therefore, there is undoubtedly a negative relationship between inflation and standard of living having established that both slopes are significant. GDP per capita reduces by USD1.8USD for an increase in inflation by one percentage point. Considering the fact that Ghana is a

developing country and has issues of poverty such that there are still people who live on less than USD2 a day, this observation should not be taken lightly. Furthermore, HDI reduces by 0.0011 for every 1% increase in inflation. Ghana is yet to record an average score of the HDI (0.5) which makes this diagnosis important. This is because standard of living in terms of HDI is barely average; and thus further decreases in standard of living (as a result of high inflation rates) can therefore be very costly.

With respect to sensitivity of standard of living to inflation, sensitivity results from both real GDP per capita and HDI calculated at the mean of the datasets revealed that standard of living is not highly sensitive to inflation: 15.63% and 6.85% for real GDP per capita and HDI respectively. This can be linked to the fact that the coefficient of determination in the regression analyses of both real GDP per capita and HDI revealed that inflation explains about a fifth of changes in standard of living. Therefore about 80% of the changes in standard of living are due to other causes. This does not mean that inflation should be ignored however. In fact, 15.63% and 6.75% do make a difference. More importantly, sensitivity analysis at interval of data points revealed that standard of living becomes increasingly elastic to inflation as inflation rises. In the case of real GDP per capita, elasticity jumped from 19.36% to 29.34% when inflation increased from 32.91 to 39.82%. The same observation was made for HDI values when elasticity at various data points was computed.

To some extent, the outcome of this study agrees with the argument of Espinoza, Leon & Prasad (2011) that inflation becomes costly at high levels. Furthermore, the results of the study agree with Barro (1995) that there is significant relationship between inflation and economic growth (standard of living in the context of this research). On the other hand, the Stanners (1996) concluded that there that there was actually no correlation between inflation and an improved growth rate. The results of this study show

otherwise at least for the specific case of Ghana. In fact, the inverse relationship between inflation and standard of living, as determined by the analyses, proves that Ghanaians will actually have an improved standard of living and thus, economic growth when inflation reduces. The outcome of the study also agrees with the conclusions by Kremer, Bick & Nautz (2009) and Ayyoub, Chaudhry & Farooq (2011) in establishing that there is a significant inverse relationship between inflation and economic welfare. Nevertheless, there are still differences in the sense that both studies (Kremer, Bick & Nautz (2009) and Ayyoub, Chaudhry & Farooq (2011)) identified thresholds at and above which inflation became hurtful and below which inflation becomes insignificant; such thresholds have not been identified for Ghana as far this study is concerned. Hence, the inverse relationship applies irrespective of the level of inflation as far as a change in inflation level takes place.

5 CONCLUSION, RECOMMENDATIONS AND FURTHER RESEARCH

5.1 Conclusions

The study set out to find out the implication of changing levels of inflation on standard of living in Ghana. This is in view of the fact that although changing inflation levels remain one of the most actively and publicly discussed economic indicators in Ghana, little meaning is conveyed about how changes in the statistic actually affects standard of living, that is if there is any effect at all. Furthermore, there is mixed conclusion with regards to existing literature; while literature on this subject specific to Ghana is unavailable. By carrying out this research, the results and conclusions serve as information which will help obtain a better understanding of how inflation affects standard of living in Ghana. The information obtained from the research will also serve as a tool available to policymakers to understand how standard of living is affected with respect to changing inflation rates so that they can make informed policies and decisions. The research also contributes to literature in light of the fact that there are mixed conclusions about how inflation affects standard of living, and also specific literature for the Ghanaian context is not available.

Regression and sensitivity (elasticity) analyses were conducted using data on inflation and standard of living taken mostly from the World Databank for the period of 1980-2012. Real GDP per capita and HDI were used as indicators of standard of living, also referred to as welfare in the study. Based on the results obtained from these analyses, this research concludes that there is a significant inverse relationship between inflation and standard of living in Ghana in the short run. The short run stance is taken due to the time lag of one year introduced in the study. The relationship between inflation and standard of living does not end there. Standard of living is only partially sensitive to inflation; the general sensitivity being quite minimal. However, the inverse

impact of inflation on standard of living increasingly worsens as inflation becomes higher. Therefore in Ghana, people are worse off as inflation increases.

Assuming low unemployment is an indicator of improved standard of living, the Philips Curve, as described earlier, describes a positive relationship between inflation and improved standard of living such that high inflation actually leads to low unemployment in the short run. This is the exact opposite in the case of Ghana based on this study. Therefore high inflation will hurt Ghanaians and vice versa. With this in mind, it is in the interest of Ghanaians that low rates of inflation be maintained.

5.2 Recommendations

Having established that inflation negatively affects standard of living in Ghana in the short run, it is recommended to policy makers and the government that more effort should be made to ensure that inflation levels are kept low; not only to maintain a decent standard of living but also to avoid a huge negative impact on standard of living since sensitivity of standard of living to inflation increases as inflation gets higher.

Also, since inflation levels can be used to interpret standard of living to some extent, measurement of inflation should be done more accurately to avoid errors. This means that the Ghana Statistical Service needs to channel more effort into determining that the right items constitute the CPI basket. The appropriate weights should also be assigned to the items in the CPI basket in order to determine the true value of inflation.

In reporting inflation data, the current rates should not be the only figures reported. Actual changes in inflation rates (difference between current rate being reported and pervious rate reported) should be reported in relation to other indicators or variables so that it becomes easier to understand what the changes in inflation actually mean or

imply. For instance, a change in inflation of x% could be explained that it would cost about z more to acquire the same quantity of an item bought on the market.

The indexation of salaries for inflation can help to curb the negative effects of inflation on the welfare of people in Ghana and resolve some social problems such as public workers going on strike. If salaries are indexed for inflation, then workers would not have to go on strike all the time with the reason that their standard of living has fallen because salaries remain the same irrespective increased fuel prices and a higher inflation rate.

Finally, it is recommended that attention should be paid to other economic indicators that could also be an indication of the standard of living in the economy such as unemployment and poverty. Policy makers tend to make a big deal of inflation as compared to these other indicators. However, it is clear that inflation accounts for only some of the changes in standard of living. These other indicators, which have the tendency to impact or reflect standard of living, should thus receive public attention also.

5.3 Further Research

This study was restricted to one determinant of standard of living: inflation. The results consequently showed that the there are other factors that affect standard of living as standard of living is only partially affected by inflation. Furthermore, these theoretical results observed could actually differ from what prevails in reality. This is because of the prevalence of income distribution inequality in developing countries for which Ghana is not different. Thus, the case could be that the people who are at a disadvantage (the poor) are actually much more affected at high levels of inflation than demonstrated in this study. These identified gaps form a basis for future research. Therefore in carrying out further studies, other factors that could possibly impact standard of living should be identified and analysed in relation to the extent their of impact. Another aspect of future

studies constitutes gathering primary data from sampled Ghanaians to determine the whether the impact of inflation on welfare on the Ghanaians is exactly as established, or the difference if any.

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APPENDICES

APPENDIX 1: **Computation of Estimate for Real GDP per capita for 2012 (provisional value)**

Provisional Real GDP = GHS28,105,000,000

Estimated Population of Ghana = 24,700,000

Real GDP per capita = $\frac{Provisional\ Real\ GDP}{Estimated\ Population}$

Real GDP per capita = $\frac{GHS28{,}105{,}000{,}000}{24{,}700{,}000}$

Real GDP per capita = GHS1137.85

Real GDP per capita in USD = $\frac{Real\ GDP\ per\ capita\ in\ cedi}{Exchange\ Rate\ as\ at\ year\ end\ (2012)}$

Real GDP per capita in USD = $\frac{\text{GHS}1137.85}{GHS\ 1.9/USD}$

Real GDP per capita in USD = 598.87

Real GDP per capita (2012 estimate) = USD598.87

APPENDIX 2: Raw Data on Inflation, Real GDP per capita and HDI

Year	Inflation, Consumer Prices (annual)	GDP per capita (constant 2000 USD)	HDI
1979	54.4413	246.6445	N/A
1980	50.0701	241.9462	0.3635
1981	116.5036	226.7589	0.3635
1982	22.2956	204.1829	0.3635
1983	122.8745	188.1487	0.3635
1984	39.6653	197.4868	0.3635
1985	10.3054	200.9364	0.3698
1986	24.5654	205.1678	0.3698
1987	39.8151	209.0657	0.3698
1988	31.3593	214.9652	0.3698
1989	25.2237	219.9076	0.3698
1990	37.2591	221.0717	0.3989
1991	18.0314	226.2823	0.3989
1992	10.0561	228.4588	0.3989
1993	24.9598	232.8513	0.3989
1994	24.8703	234.0065	0.3989
1995	59.4616	237.2936	0.4212
1996	46.5610	242.0583	0.4212
1997	27.8852	246.1978	0.4212
1998	14.6242	251.7653	0.4212
1999	12.4087	256.7400	0.4212
2000	25.1932	259.9907	0.4306
2001	32.9054	263.9615	0.4306
2002	14.8162	269.2286	0.4306
2003	26.6749	276.4052	0.4306
2004	12.6246	284.8492	0.4306
2005	15.1182	294.4080	0.4425
2006	10.9152	305.7511	0.4425
2007	10.7327	317.7364	0.4425
2008	16.5221	336.3518	0.4425
2009	19.2507	341.5523	0.4630
2010	10.7076	360.3241	0.4672
2011	8.7268	402.6953	0.4672
2012	*9.1	*598.871	0.4672

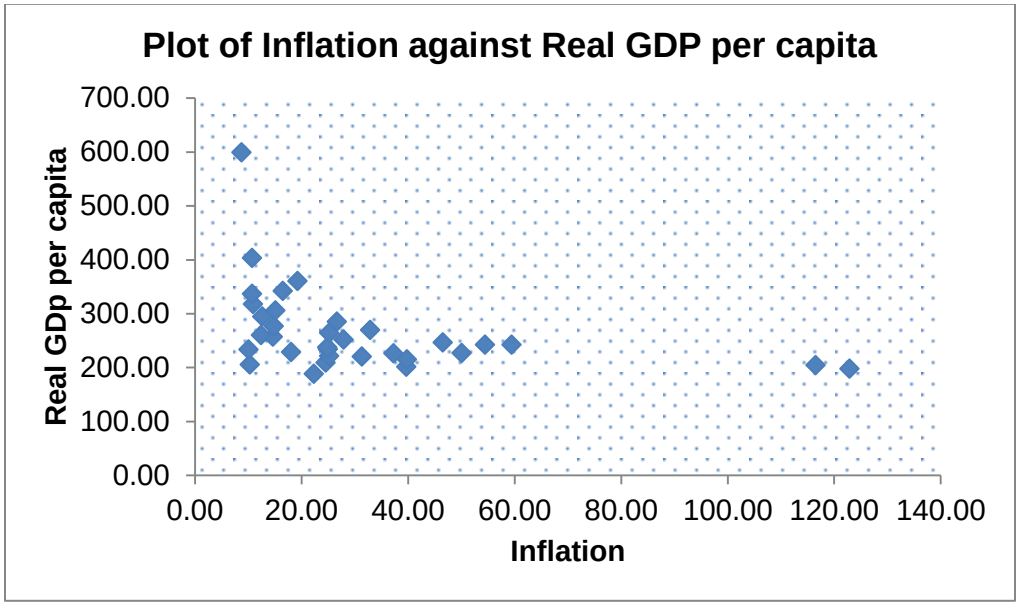
*values are provisional

APPENDIX 3: **Data as Used for Regression Analysis**

Inflation	Real GDP per Capita	HDI
54.4413	241.9462	0.3635
50.0701	226.7589	0.3635
*116.5036	204.1829	0.3635
22.2956	188.1487	0.3635
*122.8745	197.4868	0.3635
39.6653	200.9364	0.3698
10.3054	205.1678	0.3698
24.5654	209.0657	0.3698
39.8151	214.9652	0.3698
31.3593	219.9076	0.3698
25.2237	221.0717	0.3989
37.2591	226.2823	0.3989
18.0314	228.4588	0.3989
10.0561	232.8513	0.3989
24.9598	234.0065	0.3989
24.8703	237.2936	0.4212
59.4616	242.0583	0.4212
46.5610	246.1978	0.4212
27.8852	251.7653	0.4212
14.6242	256.7400	0.4212
12.4087	259.9907	0.4306
25.1932	263.9615	0.4306
32.9054	269.2286	0.4306
14.8162	276.4052	0.4306
26.6749	284.8492	0.4306
12.6246	294.4080	0.4425
15.1182	305.7511	0.4425
10.9152	317.7364	0.4425
10.7327	336.3518	0.4425
16.5221	341.5523	0.463
19.2507	360.3241	0.4672
10.7076	402.6953	0.4672
8.7268	*598.871	0.4672

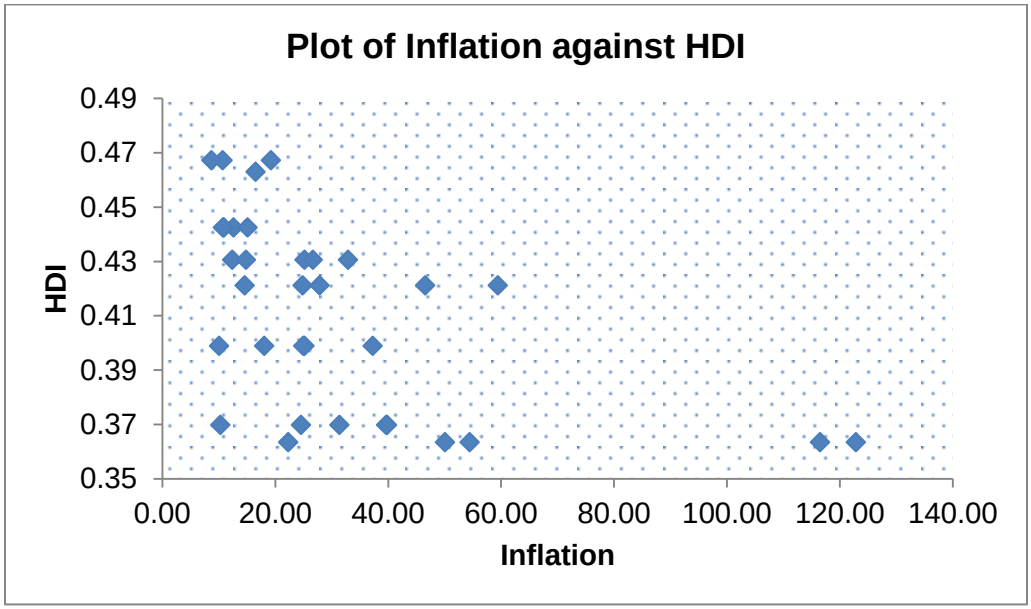
*****Figures constitute outliers

***APPENDIX 4*: Outlier Identification in the analyses involving Inflation and Real GDP per Capita Datasets**



Data points on both extreme ends of the axes were regarded outliers. Coordinates for these points were not included in the analysis.

***APPENDIX 5*: Outlier Identification in the analyses involving Inflation and HDI Datasets**



The two data points on the extreme right were treated as outliers. The coordinates for these data points were not included in the analyses.

APPENDIX 6: Summary of Data (Outliers Inclusive)

Inflation		Real GDP per Capita		HDI	
Mean	30.8310	Mean	266.5884	Mean	0.4107
Standard Error	4.6434	Standard Error	13.6381	Standard Error	0.0061
Median	24.8703	Median	242.0583	Median	0.4212
Standard Deviation	26.6746	Standard Deviation	78.3451	Standard Deviation	0.0350
Sample Variance	711.5332	Sample Variance	6137.9560	Sample Variance	0.0012
Kurtosis	6.2621	Kurtosis	9.5294	Kurtosis	-1.2338
Skewness	2.4056	Skewness	2.6701	Skewness	-0.0190
Range	114.1477	Range	410.7223	Range	0.1037
Minimum	8.7268	Minimum	188.1487	Minimum	0.3635
Maximum	122.8745	Maximum	598.8710	Maximum	0.4672
Sum	1017.4244	Sum	8797.4168	Sum	13.5545
Count	33.0000	Count	33.0000	Count	33.0000
Confidence Level(95.0%)	9.4584	Confidence Level(95.0%)	27.7800	Confidence Level(95.0%)	0.0124

APPENDIX 7: Summary of Data (Without Outliers)

Inflation		Real GDP per capita		HDI	
Mean	25.644	Mean	259.896	Mean	0.41201
Standard Error	2.55098	Standard Error	9.34583	Standard Error	0.00601
Median	24.7178	Median	244.128	Median	0.42123
Standard Deviation	13.9723	Standard Deviation	51.1892	Standard Deviation	0.03291
Sample Variance	195.225	Sample Variance	2620.33	Sample Variance	0.00108
Kurtosis	0.02059	Kurtosis	0.87462	Kurtosis	-1.0905
Skewness	0.90739	Skewness	1.10638	Skewness	-0.1169
Range	49.4054	Range	214.547	Range	0.10373
Minimum	10.0561	Minimum	188.149	Minimum	0.36346
Maximum	59.4616	Maximum	402.695	Maximum	0.4672
Sum	769.319	Sum	7796.88	Sum	12.3603
Count	30	Count	30	Count	30
Confidence Level(95.0%)	5.21733	Confidence Level(95.0%)	19.1144	Confidence Level(95.0%)	0.01229

APPENDIX 8: **Regression of Inflation on Real GDP per capita (Outliers Inclusive)**

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.4034031					
R Square	0.162734					
Adjusted R Square	0.1357255					
Standard Error	72.834601					
Observations	33					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	31963.33976	31963.3	6.02527	0.019915886	
Residual	31	164451.2522	5304.88			
Total	32	196414.592				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	303.11772	19.55044112	15.5044	3.7E-16	263.2443304	342.99111
Inflation	-1.1848231	0.482686524	-2.4546	0.01992	-2.16926873	-0.200377

APPENDIX 9: **Regression of Inflation on Real GDP per capita (Without Outliers)**

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.43232371					
R Square	0.18690379					
Adjusted R Square	0.15786464					
Standard Error	46.9752694					
Observations	30					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	14202.76044	14202.8	6.43627	0.017036288	
Residual	28	61786.92615	2206.68			
Total	29	75989.68658				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	300.51266	18.1623951	16.5459	5.5E-16	263.30868	337.7166
X Variable 1	-1.5838722	0.624313938	-2.537	0.01704	-2.862721315	-0.305023

APPENDIX 10: Regression of Inflation on HDI (Outliers Inclusive)

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.5357819					
R Square	0.2870622					
Adjusted R Square	0.2640642					
Standard Error	0.0299909					
Observations	33					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	0.01122706	0.011227	12.4821	0.001311578	
Residual	31	0.027883138	0.000899			
Total	32	0.039110198				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.4323919	0.008050239	53.71169	3.7E-32	0.415973353	0.448810496
Inflation	-0.0007022	0.000198755	-3.532995	0.00131	-0.001107562	-0.00029684

APPENDIX 11: **Regression of Inflation on HDI (Without Outliers)**

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.460750283					
R Square	0.212290823					
Adjusted R Square	0.184158352					
Standard Error	0.029724956					
Observations	30					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	0.006667542	0.00667	7.54611	0.01039642	
Residual	28	0.024740044	0.00088			
Total	29	0.031407586				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.43984056	0.011492779	38.271	1E-25	0.41629867	0.463382
Inflation	-0.00108522	0.000395053	-2.747	0.0104	-0.00189445	-0.000276